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ABSTRACT

This curriculum guide is designed to provide students in grades 11-12 with advanced business computer programming background and skills that will transfer through the 2+2+2 to community colleges participating within Texas and later to four-year participating colleges and universities. Introductory pages list procedures for using the guide; essential elements for all vocational programs, for office education, and for this guide; a suggested scope and sequence; and suggested resources. The guide is divided into 11 units that are correlated with the essential elements for business computer programming II. Units are grouped into five sections that contain the essential elements, suggested unit lesson plans, answer sheets, and terminology for the units within the section. Each unit contains the following: objectives for both the units and the student; generalization; unit overview; activity sheets; competency tests; and proficiency checklists. Sections (and units) are as follows: (1) system development process (system analysis and design, system development, implementation, user documentation); (2) documentation and maintenance (documentation, program maintenance); (3) structured programming (program specification and development cycle, program design, coding, operating systems environment); and (4) program testing (program testing). Appendixes include additional teacher activities, reference and resource addresses, 2+2+2 guidelines, modification for special needs students, an outline of common essential elements for all ofice education programs, and a supplementary unit on the system development process. (YLB)

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BUSINESS COMPUTER PROGRAMMING II

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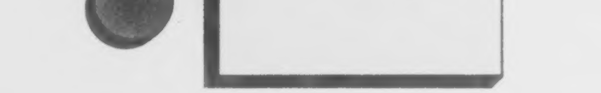

Curriculum Guide

OCCUPATIONAL CURRICULUM LAB EAST TEXAS STATE UNIVERSITY

CE059273

BO-305-CG

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BUSINESS COMPUTER PROGRAMMING II

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ETSU, an Equal Opportunity University

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PREFACE

The Office Education Business Computer Programming II Curriculum was prepared to provide quality instructional materials for Office Education courses in Texas. The Occupational Curriculum Laboratory is currently developing and disseminating competency-based materials under contract with the Texas Education Agency for both secondary and postsecondary programs. All publications and instructional materials are developed and coordinated by curriculum specialists who are experienced instructors and are validated for technical content by business and industry.

Curriculum guides in this series are designed for five occupationally specific courses and one cluster course: Business Information Processing, Business Computer Applications I and II, Business Computer Programming I and II, and Microcomputing Applications. These guides serve as an excellent basis for achieving the Office Education essential elements mandated by the Texas Education Agency. The purpose of developing these curriculum guides is to provide the instructors with a comprehensive curriculum guide that furnishes an outline correlated to the essential elements, that is scoped and sequenced, and which furnishes a structure from which to prepare lesson plans. A competency checklist is provided for recording student's mastery or non-master of the essential elements. Suggestions and comments concerning these curriculum guides are requested.

INTRODUCTION

This guide is one of the curriculum guides developed for Office Education programs in Texas. The guides are formatted in sections and then broken down into units of instruction to assist in the mastery of the program by experienced teachers across the state. The guides were written in such a manner that uniformity in classroom instruction and program accountability across the state may be verified.

The instructional method used will depend upon class size, student abilities, and equipment. Each unit addresses the cognitive, affective, and psychomotor domains. Because each student learns differently and because each program should meet the needs of its local population, this guide was developed with flexibility, allowing the instructor to teach basic skills in a variety of methods. Modifications for special needs students is included in the appendix. Each instructor is encouraged to modify, add, or delete information as necessary to meet the individual needs of each student and the needs of the local program.

The Business Computer Programming II occupationally specific course is an office education program for students in grades 11-12 who have completed Business Computer Programming I. It may be a 175, 350, or 525 hour (1,2,or 3 credit) total program. The intent of the program is to provide students with advanced business computer programming background and skills which will transfer through the 2+2+2 to community colleges participating within the state of Texas and later to a four year participating colleges and universities.

This curriculum guide is intended to help instructors and administrators of the *Business Computer Programming II* occupationally specific course. Introductory pages of the curriculum lists procedures for utilizing the curriculum guide, common essential elements for all vocational programs; essential elements for Office Education; essential elements for this guide; a suggested scope and sequence; and suggested resources--texts, resources, software, audio visuals. Each section contains the essential elements, suggested unit lesson plans, answer sheets, and terminology for the units within the section. Appendices appear at the end of this publication which includes teacher additional activities, reference and resources addresses, 2+2+2 guidelines, and modification for special needs students.

The curriculum guide is divided into eleven units. The units are correlated with the essential elements for Business Computer Programming II. Although many of the activities suggested in these guides could be completed without the use of outside resources, in order to assist the students in gaining realistic experience in office occupations, it is suggested that the Office Education instructor utilize some of the resources listed in this curriculum guide.

It is suggested that the instructor wishing to use this curriculum guide first read the "Use of Instructional Materials" before beginning any instruction. The "Lesson Plans" contained in each unit of instruction includes suggested teacher activities which should also be read carefully so that additional supplies and outside resources needed for completion of the unit can be secured. The instructor is encouraged to be creative in the use of the materials and information.

USE OF THE INSTRUCTIONAL UNITS

Each instructional section in the Office Education *Business Computer Programming II* curriculum guide is correlated to the essential elements. The basic components of the section pages include: essential element, lesson plans, answer sheets, and terminology. Each unit contains objectives for both the unit and the student, generalization, unit overview, activity sheets, competency tests, and proficiency checklists.

SECTION PAGES

Unit Lesson Plans

The unit lesson plans present the unit objective, student objective, focus, allocated time, domains, basic skills, content outline, suggested teacher activities and reteach activities, and specific teacher activities. Each unit lesson planned is designed to serve as a tool to facilitate the teacher in the preparation of daily lesson plans and to serve as a basic curriculum outline for each essential element.

Suggested teacher activities and reteach activities are provided. They are basic areas that need to be completed for each unit. Specific teacher activities provide information for the teacher so that adequate preparation may be made prior to starting the unit. Specific bulletin boards, types of guest speakers or field trips, and types of programs needed for specific student activities are included.

Answers

Answers are provided for all the activities and competency tests. Because of the diversified programs, and equipment in use across the state, some answers need to be provided by the teacher.

Terminology

Terminology lists and definitions are provided where appropriate. This may be pulled and duplicated for student use.

UNIT CONTENT

Objectives

The objective page states the goals of the program, thus providing a sense of direction and accomplishment for the student. Each unit of instruction is based on performance objectives. These performance objectives are stated in two forms: (1) unit objectives, which state the terminal performance expected of the student upon completion of the unit, and (2) student objectives which are those performances that will help the student to master the unit objective.

The objectives of the unit provide direction for the learning process. Therefore, it is important for teacher and students to discuss the objectives prior to covering the information in the unit. This discussion will provide a common understanding between teacher and student of the intent of the objectives. Performance terms have been used in all objectives of the units to assist in promoting the effectiveness among all individuals using the materials.

Instructors should feel free to delete or add objectives to tailor the material to the needs of the students and the program. When objectives are added, corresponding information, activities, and evaluation should be designed and constructed.

In addition, a generalization is provided to guide the teacher in showing the students why they are studying this specific area and provides a focus.

Unit Overview

The Unit Overview is provided as a guide for teachers on what materials to cover that will specifically meet the essential element. It should be noted that the overview is not designed as a total source. The unit overview is an attempt to condense available current information in order to provide content essential for meeting cognitive (knowledge) objectives of the unit. The teacher will find that the unit overview serves as an excellent guide for presenting the background knowledge necessary to develop the skill specified in the unit objective. Information may be presented in several ways:

(1) The instructor may use the information sheet as a guide for presenting the background knowledge necessary for students to complete the specific objectives and, ultimately, the unit objective, or;

(2) Students may be allowed to read the unit overview sheets before or as information is discussed in class. Students should take notes on any additional information presented.

Activity Sheets

Learning activities are provided for each of the student objectives in the unit. They provide direction to study and also provide application and reinforcement of cognitive materials presented using the psychomotor and affective domains. An effort has been made to incorporate the following elements of the learning process: translation, interpretation, application, analysis, synthesis, and evaluation so that the learning style of each student will be recognized.

The activity sheets may be given to the students for completion in class or may be used as homework assignments. Answer sheets are provided with the section information which may be used by the teacher and/or student in checking progress.

The instructor should preview the activities prior to making student assignments to assure that information has been covered and all supplies required are available. Specific suggestions have been made in the Unit Lesson Plan. Class time should be set aside for those that require group participation. Those activities that require student participation rather than written answers should be evaluated to the satisfaction of the instructor.

Competency Tests

Evaluation is most successful when objectives are clearly stated in advance of learning experience. The evaluation should be used to measure students' attainment of those specific objectives. Competency tests allow teachers to make a judgment about student progress in relation to a pre-determined standard. These standards should reflect those established by the business community for entry level employees. It is important that students understand the criteria that are used to evaluate their competency in a given subject area.

Written tests are provided for each unit. These tests are provided to measure the students' understanding of the information covered in the unit overview. Parts of the competency test are queued to the essential element and student objectives covered in the unit. Individual test items may be used as a pre-test measure or as a review or oral quiz to assist the teacher in spotting difficulties being encountered by students in their efforts to accomplish the unit objective. The instructor should construct additional test items for any objectives and information added to the unit.

The evaluation instruments in this curriculum guide may be used in the following ways:

Individualized Instruction--After brief directions from the instructor, the student may complete the activities, and is then ready for the competency test. If the test results show a weakness in a specific area, the student should review that portion of the unit overview and retake the test.

Group Instruction--After participating in classroom discussion and completing the student activities, the student should be able to demonstrate mastery of items listed in the competency checklist in the curriculum guide. The competency test can be used to measure students' progress toward meeting these objectives.

Remedial and Reteach Instructions--Students who demonstrate a poor understanding of the subject matter may need remedial help. Competency tests in basic skills may be administered to diagnose the problem areas. For example, students in a computer programming class could take a competency test in this area to locate the deficiency. Once identified, remedial instructions could be initiated.

Competency Checklists

Competency Checklists are provided for each unit. The checklist was developed to assist the teacher in recording individual student progress toward the accomplishment of the unit competencies and in recording the mastery of each essential element. Space has been provided for additional reteach activities and other assignments. The checklists may be accumulated in a file and may serve as a portion of a competency profile. They may also be used as documentation for the student who is applying for 2+2+2 credit.

SUGGESTED SCOPE AND SEQUENCE

BUSINESS COMPUTER PROGRAMMING II

SECTION/UNIT	TITLE	WEEKS	HRS.
I.	**SYSTEM DEVELOPMENT PROCESS**	**10**	**50**
1	System Analysis and Design	3	15
2	System Development	2	10
3	Implementation	2	10
4	User Documentation	3	15
II.	**IMPLEMENTATION AND MAINTENANCE**	**5**	**25**
1	Documentation	3	15
2	Maintenance	2	10
III.	**STRUCTURED PROGRAMMING**	**13**	**65**
1	Program Specification and Design	3	15
2	Program Structure	2	10
3	Coding	5	25
4	Operating System Environment	3	15
IV.	**PROGRAM TESTING**	**2**	**10**
1	Program Testing	2	10
	TOTAL WEEKS/HOURS ALLOCATED:	**30**	**150**

One week has been set aside each six weeks for review, makeup work, and testing.

OFFICE EDUCATION ESSENTIAL ELEMENTS

BUSINESS COMPUTER PROGRAMMING II

75.87

(h) Business Computer Programming II (one, two, or three units) shall include the following essential elements:

(1) Concepts and skills related to application system development. The student shall be provided opportunities to:

(A) demonstrate a comprehension of the system development process;

(B) demonstrate a comprehension of the implementation process; and

(C) develop user documentation.

(2) Concepts and skills related to structured programming application. The student shall be provided opportunities to:

(A) develop an understanding of structured programming;

(B) identify the concepts of random and sequential files;

(C) translate solutions into major structural elements of a program;

(D) translate solutions into language statements for input, processing, and output; and

(E) develop ability to use an advanced operating system computer.

(3) Concepts and skills related to program testing. The student shall be provided opportunities to:

(A) develop test data and testing techniques;

(B) apply test data to programs run on the computer; and

(C) demonstrate the ability to debug and audit programs.

(4) Concepts and skills associated with software implementation and maintenance. The student shall be provided opportunities to:

(A) write documentation for maintaining a system;

(B) understand the process of implementing a system into production status; and

(C) develop an understanding of the programmer responsibilities in program maintenance.

RESOURCES

SUGGESTED TEXTBOOKS

ADDISON-WESLEY GUIDE FOR ADVANCED PLACEMENT COMPUTER SCIENCE
S. Rhoads
Addison-Wesley Publishing Company

ADVANCED BASIC: A STRUCTURED APPROACH
Eileen Klimick Schoaff
West Publishers

ADVANCED STRUCTURED BASIC
Clark and LaBarre
South-Western Publishing

ADVANCED STRUCTURED COBOL PROGRAM DESIGN AND FILE PROCESSING
Shelly and Cashman
Anaheim Publishing

ANALYSIS AND DESIGN OF INFORMATION SYSTEMS
James A. Senn
McGraw-Hill Book Company

ANSI FORTRAN IV--A STRUCTURED APPROACH
William C. Cole
Brown Publishing

APPLE II INSTANT PASCAL AN INTRODUCTION TO PROGRAMMING
Moll/Folsom
Houghton Mifflin

APPLESOFT BASIC FUNDAMENTALS AND STYLE
James S. Quasney and John Maniotes
Boyd and Fraser Publishing Company

BASIC A PROBLEM-SOLVING APPROACH
R. Tingey, W. Mott, B. Niebuis
Addison-Wesley Publishing Company

BASIC CONCEPTS AND STRUCTURED PROBLEM SOLVING
Michel Boillot
West Publishers

BASIC FOR STUDENTS USING THE IBM PC
M. Trombetta
Addison-Wesley Publishing Company

BASIC PRINCIPLES OF DATA PROCESSING
James A. Saxon and Wesley W. Steyer
Prentice-Hall, Inc.

BASIC PROGRAMMING
Larry Long
Prentice-Hall, Inc.

BASIC PROGRAMMING TODAY
Steven L. Mandell
West Publishers

BASIC PROGRAMMING TODAY: A STRUCTURED APPROACH
Steven L. Mandell
West Publishers

BASIC: CONCEPTS AND STRUCTURED PROBLEM SOLVING
Michel Boillot
West Publishers

BIG BLUE BASIC
Peter Rob
Wadsworth Publishing

BUSINESS SYSTEM ANALYSIS AND DESIGN
Gary B. Shelly and Thomas J. Cashman
Anaheim Publishing

COMPLETE BASIC PROGRAMMING
Steven L. Mandell and Richard M. Wests
Prentice-Hall, Inc

COMPLETE BUSINESS BASIC
K. Trester, J. Priddy, D. Nielsen
Addison-Wesley Publishing Company

COMPUTER ALGORITHMS AND FLOWCHARTING
Gerald A. Silver and Joan B. Silver
Gregg Community College Division
McGraw-Hill Book Company

COMPUTER AND DATA PROCESSING
H. L. Capron and Brian K. Williams
The Benjamin/Cummings Publishing Co., Inc.

COMPUTER CONCEPTS
Marilyn Bohl
Science Research Associates

COMPUTER FUNDAMENTALS FOR AN INFORMATION AGE
Gary B. Shelly and Thomas J. Cashman
Anaheim Publishing

COMPUTER INFORMATION SYSTEMS
David Adams and Gerald Wagner
South-Western Publishing Company

COMPUTER PROGRAMMING IN THE BASIC LANGUAGE
French, Jacobs, Moulds, and Schuchman
Prentice-Hall, Inc

COMPUTER PROGRAMMING RGP II
Gary B. Shelly and Thomas J. Cashman
Anaheim Publishing

COMPUTERS
Diane Krasnewich and Timothy N. Trainor
Mitchell Publishing, Inc.

COMPUTERS
Larry Long and Nancy Long
Prentice-Hall, Inc.

COMPUTERS AND INFORMATION TECHNOLOGY
Daggett, Badrkhan, and Kruse
South-Western Publishing

COMPUTERS AND DATAPROCESSING
H. L. Capron and Brian K. Williams
The Benjamin/Cummings Publishing Company

COMPUTERS AND INFORMATION PROCESSING
William M. Fuori and Lawrence J. Aufiero
Prentice-Hall, Inc.

COMPUTERS AND INFORMATION SYSTEMS
Jerome S. Burnstein
CBS College Publishing

COMPUTERS AND INFORMATION SYSTEMS
Gore and Stubbe
McGraw-Hill Book Company

COMPUTERS AND TEACHING
Gregg Brownell
West Publishers

COMPUTERS IN BUSINESS
Larry Long
Prentice-Hall, Inc.

ELEMENTS OF SYSTEMS ANALYSIS, 4TH EDITION
Marvin Gore and John Stubbs
William C. Brown Publishers

FUNDAMENTALS OF STRUCTURED COBOL
L. Wayne Horn and Gary M. Gleason
Boyd and Fraser Publishing Company

GUIDE TO MICROCOMPUTERS
Fronz J. Frederick
AECT Publications Sales

INFORMATION PROCESSING
Marilyn Bohl
Science Research Associates

INTRODUCTION TO COMPUTERS AND DATA PROCESSING
Gary B. Shelly and Thomas J. Cashman
Anaheim Publishing Company

INTRODUCTION TO COBOL
R. Overbeek, W. Singletary
Addison-Wesley Publishing Company

INTRODUCTION TO COMPUTER PROGRAMMING STRUCTURED COBOL
Gary B. Shelley and Thomas J. Cashman
Anaheim Publishing

INTRODUCTION TO COMPUTER SCIENCE
S. Garland
Addison-Wesley Publishing Company

INTRODUCTION TO COMPUTERS AND APPLICATION SOFTWARE
Robert H. Blissmer and Robert H. Alden
Houghton Mifflin Company

INTRODUCTION TO COMPUTERS AND BASIC PROGRAMMING
Kathleen Brenan and Steven L. Mandell
West Publishers

INTRODUCTION TO COMPUTERS AND INFORMATION PROCESSING
Larry Long
Prentice-Hall, Inc.

INTRODUCTION TO FLOWCHARTING AND COMPUTER PROGRAMMING LOGIC
Gary B. Shelly and Thomas J. Cashman
Anaheim Publishing Company

INTRODUCTION TO PASCAL
A. Picciotto
Addison-Wesley Publishing Company

JOB CONTROL LANGUAGE
Ashley and Fernandez
Wiley Publishing

LEARNING COMPUTER PROGRAMMING: STRUCTURED LOGIC, ALGORITHMS, AND FLOWCHARTING
Gerald A. Silver and Myrna L. Silver
Boyd and Fraser Publishing Company

LOGIC AND STRUCTURED DESIGN FOR COMPUTER PROGRAMMERS
Harold J. Rood
PWS Publishing

MACINTOSH HANDS-ON PASCAL
Ted G. Lewis and Abbas Birjandi
Wadsworth Publishing

MACINTOSH PASCAL
Moll/Folsom
Houghton Mifflin Company

MICROCOMPUTER MANAGEMENT AND PROGRAMMING
Carol Anne Ogdin
Prentice-Hall, Inc.

MICROCOMPUTERS, SOFTWARE, AND APPLICATIONS
Dennis P. Curtain and Leslie R. Porter
Prentice-Hall, Inc.

MINICOMPUTER SYSTEMS
M. Vardell Lines and Boeing Computer Services
Winthrop Publishers, Inc.

MS-DOS ADVANCED APPLICATIONS, VOLUME 2
David A. Lien and Lewis Rosenfelder
Compusoft Publishing

MS-DOS THE BASICS, VOLUME 1
David A. Lien and Gary Williams
Compusoft Publishing

MVS JCL
Wayne Clary
Murach Publishing

PASCAL
R. Lamb
Addison-Wesley Publishing Company

PASCAL AN INTRODUCTION TO METHODICAL PROGRAMMING
Findlay/Watt
Houghton Mifflin Company

PASCAL PROGRAMMING TODAY
Steven L. Mandell
West Publishers

PASCAL--A GENTLE APPROACH
Rodney Rambally and Gerard Rambally
Prentice-Hall, Inc.

PROBLEM SOLVING AND STRUCTURED PROGRAMMING IN PASCAL
E. Koffman
Addison-Wesley Publishing Company

PROBLEM SOLVING WITH STRUCTURED FORTRAN 77
D. M. Etter
Addison-Wesley Publishing Company

PROGRAM DESIGN WITH PSEUDOCODE
T. E. Bailey and Kris Lundaard
Cole Publishing Company

PROGRAMMING BY DESIGN, A FIRST COURSE IN STRUCTURED PROGRAMMING
Philip L. Miller and Lee W. Miller
Wadsworth Publishing

PROGRAMMING FOR MICROCOMPUTERS APPLE II BASIC
Shane
Houghton Mifflin Company

PROGRAMMING LOGIC
Leeson
Science Research Associates

PROGRAMMING LOGIC FOR BUSINESS APPLICATION
Pay, Pitter, and Leigh
Nutchell Publisher

REASONING WITH A COMPUTER IN PASCAL
D. Solow
Addison-Wesley Publishing Company

STRUCTURED BASIC
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South-Western Publishing Company

STRUCTURED BASIC
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Times Mirror/Mosby Publishing

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Gary B. Shelly, Thomas J. Cashman, and Steven G. Forsythe
Anaheim Publishing

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Gary B. Shelly, Thomas J. Cashman, and Steven G. Forsythe
Boyd & Fraser Publishing Company

STRUCTURED PROGRAMMING USING PASCAL
Crawley, McArthur, and Miller
Prentice-Hall, Inc.

STRUCTURING PROGRAMS IN MICROSOFT BASIC
Michael J. Cox and Kathleen Broell Sullivan
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STRUCTURED PROGRAMMING LOGIC
Mason, Thomas W.
Prentice-Hall, Inc.

SUCCESSFUL PROBLEM SOLVING TECHNIQUES
Carole Greens, John Gregory, Dale Seymour
Creative Publications

SYSTEMS ANALYSIS AND DESIGN METHODS
Jeffrey Whitten, Lonnie Bentley, and Thomas I. M. Ho
Times Mirror/Mosby College Publishing

UNDERSTANDING PASCAL: A PROBLEM SOLVING APPOACH
Steven L. Mandell and Colleen J. Mandell
West Publishers

UNDERSTANDING STRUCTURED COBOL, II
Michel Boillot
West Publishers

USING COMPUTER IN AN INFORMATION AGE
Richard W. Grightman and Jeffery M. Dimsdale
Delmar Publishing

USING MICROPROCESSORS AND MICROCOMPUTERS
The 6800 Family
Joseph D. Greenfield, William C. Wray
Wiley and Sons, Inc.

WRITING STRUCTURED COBOL
D. Johnson
Addison-Wesley Publishing Company

SUGGESTED RESOURCE BOOKS

ADVANCED 80386 PROGRAMMING TECHNIQUES
James I. Turley
Osborne, Borland, McGraw Hill Publishers

ADVANCED C: SECOND EDITION
Herbert Schildt, James I. Turley
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Thomas Wrona
Scott, Foresman, and Company

MICROS TO MAINFRAMES
Ronald F. Kopeck
Osborne, Borland, McGraw Hill Publishers

OS/2 MADE EASY
Herbert Schildt
Osborne, Borland, McGraw Hill Publishers

OS/2: THE POCKET REFERENCE
Kris James
Osborne, Borland, McGraw Hill Publishers

PC SECRETS: TIPS FOR POWER PERFORMANCE
James F. Kelly
Osborne, Borland, McGraw Hill Publishers

QUICK BASIC: THE COMPLETE REFERENCE
Steven Nameroff
Osborne, Borland, McGraw Hill Publishers

QUICK REFERENCE GUIDE TO MS-DOS COMMANDS
Van Wolverton
Microsoft Press

RUNNING MS-DOS
Van Wolverton
Microsoft Press

SILICON VALLEY: THE MAKING OF THE PC
Paul Freeberger and Michael Swaine
Osborne, Borland, McGraw Hill Publishers

THE COMPLETE APPLE IIGS PROGRAMMER'S GUIDE
Dan Shafer
Scott, Foresman and Company

THE MS-DOS ENCYCLOPEDIA
Microsoft Press

TURBO C: THE POCKET REFERENCE
Herbert Schildt
Osborne, Borland, McGraw Hill Publishers

TURBO PASCAL VERSION 4.0: THE POCKET REFERENCE
Kris James
Osborne, Borland, McGraw Hill Publishers

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Ed Jones
Osborne, Borland, McGraw Hill Publishers

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Herbert Schildt
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Mark S. Matthews and Carole Boggs Matthews
Osborne, Borland, McGraw Hill Publishers

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Steven Ward
Osborne, Borland, McGraw Hill Publishers

WARDO'S PROGRAMMING SECRETS
Kris James
Osborne, Borland, McGraw Hill Publishers

YOUR IBM PC MADE EASY
Jonathon Sacks
Osborne, Borland, McGraw Hill Publishers

SUGGESTED SOFTWARE

ACCEL 3 AND 4 COMPILERS FOR TRS BASIC $
DiskCount Data
TRS-80

ACE PROGRAMMER $
Instructor's Computer Directory for Schools
Apple II, IIE, IIC 48k
IBM PC, XT, AT, 128k

ALCOR PASCAL $$
Alcor Systems
TRS-80

BASIC $
Abacus Software
Commodore 64/128

BASIC INSTRUCTION COURSE $
Also teaches DOS commands
Alphanetics
Instructor's Computer Directory
Instructor Publications
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BASIC TEACHER $
AV Systems, Inc.
Instructor's Computer Directory
Instructor Publications
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BASIC TUTOR SERIES $
Heffernan One-Source
Apple II, IIE, IIC 48k

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AV Systems, Inc.
Instructor's Computer Directory
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IBM PC, XT, AT, 128k

C LANGUAGE $
Alcor Systems
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TRS-80

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Tandy Corp.
Instructor's Computer Directory
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Tandy Corp.
Instructor's Computer Directory
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IBM PC, XT, AT, 128k

COMPUTER SCIENCE I, II, II $$
CBS Interactive Learning
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Instructor Publications
Apple II, IIE, IIC 48k
IBM PC, XT, AT, 128k

DS TUTOR $
DOS Tutor
Design Software Inc.
Learning Services
IBM PC, XT, AT

FOR YOUR NEXT ADVENTURE $
Sunburst Communications
Instructor's Computer Directory
Instructor Publications
Apple II, IIE, IIC 48k

HOW TO PROGRAM IN BASIC LANGUAGE TUTORIALS $
Instructor's Computer Directory
Instructor Publications

INFORMATION PROCESSING $
South-Western Publishing Company
Apple II, IIE, IIC 48k
IBM PC, XT, AT, 128k

INTRO SERIES $$
Comprehensive Software
Instructor's Computer Directory
Instructor Publications
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IBM PC, XT, AT, 128k

INTRODUCTION TO PASCAL $$$$
Tandy Corporation
Instructor's Computer Directory
Instructor Publications
TRS-80 model II series

LEARNING PASCAL SERIES $
J. Weston Walch, Publisher
Apple II, IIE, IIC 48k

LEARNING TO USE THE DISK OPERATING SYSTEM
Southern Computer Systems, Inc.
Workbook & diskette, IBM

MACHINE LANGUAGE STEP BY STEP $
Heffernan One-Source
Apple II, IIE, IIC 48k

MAZE/TURTLE $
EduSoft
Instructor's Computer Directory
Instructor Publications
Apple II, IIE, IIC 48k

MAZETALK ADVENTURES $
EduSoft
Instructor's Computer Directory
Instructor Publications
Apple II, IIE, IIC 48k

MICROPASCAL
J. Weston Walsh
Apple II, IIE, IIC 48k

MONITOR 5 $
DiskCount Data
TRS-80

MULTI-BASIC LANGUAGE $$
Alcor Systems
DiskCount Data
TRS-80

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TRS-80

PRO-WAM
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TRS-80

PROFESSOR DOS $
Individual Software, Inc.
Learning Services

RAZZLE DAZZLE $$
Psychological software
Instructor's Computer Directory
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SIMULATED COMPUTER
Edusoft
Instructor's Computer Directory
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TRS-80 model II series
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SUPER C $$
Abacus Software
Learning Services
Commodore 64/128

SUPER PASCAL $$
Abacus Software
Learning Services
Commodore 64/128

SUPERIOR BASIC $$
DiskCount Data
TRS-80

TML PASCAL $$
Terrapin
Learning Services
Apple IIGS

TRSCROSS $$
DiskCount Data
TRS-80

TURBO C $$
Borland International
IBM PC, XT, AT--128k

TURBO GRAPHIX TOOLBOX $
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TURBO PASCAL $$
Borland International
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IBM PC, XT, AT--128k

TURBO PASCAL TOOLBOX: NUMERIC METHODS $$
Borland International
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IBM PC, XT, AT--128k

TURBO PASCAL TUTOR $$$
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ZBASIC $$
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Kaypro 2,4,10 TRS-80

ZEUS EDITOR/ASSEMBLER
DiskCount Data
TRS-80

SUGGESTED AUDIOVISUALS

A COMPUTER GLOSSARY $$$
16 mm film
10 min.
Encyclopedia Britanica Educational Corporation

ADVANCED BASIC TECHNIQUES $$
Filmstrip
Educational Activities, Inc.

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Educational Activities, Inc.

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COMPUTER BASICS $$
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COMPUTER COMPONENTS $$$
Vocational Media Associates

COMPUTER HARDWARE: WHAT IT IS AND HOW IT WORKS $$$
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The Center for the Humanities.

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Filmstrip
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Video
An excursion into the world of computers.
South-Western Publishing

COMPUTERS $$
16 mm film
11 min.
BFA Educational Media

COMPUTERS AND THE FUTURE $$
16 mm film
30 min.
Time Life Multimedia

COMPUTERS, THE FRIENDLY INVASION $$
16 mm film
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Walt Disney Films

COMPUTERS, THE INSIDE STORY $$
16 mm film
19 min.
Churchill Films

COMPUTERS, TOOLS FOR PEOPLE $$$
16 mm film
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Churchill Films

COMPUTERS--THE TRUTH OF THE MATTER $$$
16 mm film
15 min.
Walt Disney Films

COMPUTERS: FROM PEBBLES TO PROGRAMS
Slides - $$$$, video or filmstrips - $$$

HANDLING & PROCESSING INFORMATION $$$$
The Center for the Humanities.

HOW THE COMPUTER WORKS $$$
filmstrip
Opportunities for Learning, Inc.

INTRODUCTION TO BASIC $$$$
Tandy Corporation

LEARNING DOS AND LEARNING DOS II $
Video
Career Publishing Incorporated

PASCAL: A MODERN PROGRAMMING LANGUAGE $$
Filmstrip
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THE COMPUTER $$$
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AIMS Instructional Media Services, Inc.

THE COMPUTER POSTER $
Creative Publications

WORDPROCESSING IN ACTION $
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Glencoe Publishing

Cost Key

$	$ 50.00
$$	$150.00
$$$	$250.00
$$$$	$400.00

MAGAZINES

ADMINISTRATIVE MANAGEMENT
P. O. Box 544
Martinesville, NJ 08836

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908 George Street
Santa Clara, CA 95050

BUSINESS SOFTWARE
M & T Publishing
P.O. Box 27925
San Diego, CA 92128

BYTE: THE SMALL SYSTEMS JOURNAL
70 Main Street
Peterborough, NH 03458

CLASSROOM COMPUTER LEARNING
Peter Li Inc.
2451 East River Rd.
Dayton, Oh 45439

COMPUTE!
P. O. Box 5406
Greensboro, NC 26403

COMPUTERWORLD
International Data Corporation
60 Austin Street
Newton, MA 02160

CREATIVE COMPUTING: THE MAGAZINE OF RECREATIONAL AND EDUCATIONAL COMPUTING
P. O. Box 789-M
Morristown, NJ 07968

DATAMATION
Cahners Publishing Co.
249 West 17th St.
New York, NY 10011

FAMILY COMPUTING
Scholastic Inc.
351 Garver Rd.
P.O. Box 2700
Monroe, OH 45050-2700

INTERFACE AGE: MICROCOMPUTING FOR HOME AND SMALL BUSINESS
13913 Artesia Blvd.
Cerritos, CA 90701

KILOBAUD: THE SMALL COMPUTER MAGAZINE
Peterborough, NH 03458

PC MAGAZINE
39 East Hanover Avenue
Morris Plains, NJ 07950

PC WORLD
555 DeHaro Street
San Francisco, CA 94107

PERSONAL COMPUTING
50 Essex Street
Rochelle Park, NJ 07662

PERSONAL PUBLISHING
Box 390
Itasca, IL 60143

POPULAR COMPUTING
70 Main Street
Peterborough, NH 03458

RUN: THE COMMODORE 64/128 USERS GUIDE
C. W. Communications
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Farmingdale, NY 11737

SOFTWARE DIGEST
EDP Services, Inc.
7620 Turtle Turnpike
Annadale, VA

SOFTWARE REVIEW
Microform Review, Inc.
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Westport, CT 06880

THE TECHNOLOGICAL HORIZONS IN EDUCATION JOURNAL
Information Synergy Inc.
2626 South Pullman
Santa Ana, CA 92705

TEXAS COMPUTING
17806 Davenport, Suite 105
Dallas, TX 75252
(214) 931-0157

SECTION I

SYSTEM DEVELOPMENT PROCESS

ESSENTIAL ELEMENT

75.87(h)(1)

Concepts and skills related to application system development.

The student will be provided opportunities to:

A. demonstrate a comprehension of the system development process;

B. demonstrate a comprehension of the implementation process; and

C. develop user documentation.

SUGGESTED UNIT LESSON PLAN

SECTION I: SYSTEM DEVELOPMENT PROCESS

UNIT I: SYSTEM ANALYSIS AND DESIGN

ESSENTIAL ELEMENT: 75.87 (h)(1)(A)

ALLOCATED TIME: 15 Hours

UNIT OBJECTIVE: Students will demonstrate comprehension of the system analysis and design process.

STUDENT OBJECTIVES: After completing this unit, the student will be able to:

1. Define and use system analysis terminology
2. Describe the role of each system's team member
3. List in order the five phases of the system analysis and design process
4. Discuss the importance of the goals and outcome of system analysis and design
5. Describe the five aspects of the feasibility study, and explain their part in the overall process
6. Discuss the scope and meaning of the detailed investigation
7. Identify and define each step of the design phase

FOCUS: System analysis and design is a people-oriented process requiring understanding about the needs and concerns of others. Students are generally quick to recognize that systems analysts need to mix a strong technical background with strong human relations skills while working to solve the end-user's problem.

DOMAINS: Activities and competency tests have been designed to provide learning experiences utilizing the affective, cognitive, and/or psychomotor domains.

BASIC SKILLS: Activities and competency tests have been designed to reinforce the basic skills of reading, writing, and/or mathematics.

CONTENT OUTLINE

I. Introduction to system analysis and design terminology
  A. Definition of terms
  B. Use of terminology in proper context
II. Job description of key team members
  A. Systems analyst and programmer/analyst
  B. The programming team
  C. The documentation specialist
III. Goals and results of the five phases of a system analysis and design project
  A. Goals and results of the feasibility study
  B. Goals and results of the detailed investigation
  C. Goals and results of the system design
  D. Goals and results of the system development
  E. Goals and results of the implementation and evaluation
IV. The feasibility study
  A. Purposes for the study
  B. Technical feasibility
  C. Financial feasibility
  D. Operational feasibility
  E. Scheduling feasibility
  F. Feasibility report
V. Detailed investigation/data gathering
  A. Organization information
  B. Employee information
  C. Job description information
  D. Work environment information
  E. Questionnaires
  F. Interviews (structured and unstructured)
  G. Observation
  H. Data analysis
VI. System design component
  A. The programming team
  B. System flow document
  C. Program specifications

SUGGESTED TEACHER ACTIVITIES

General Teacher Preparations

1. Preview the unit and review objectives.
2. Decide on a variety of instructional methods to present the unit.
3. Prepare questioning techniques and closure statements.
4. Make modifications in curriculum for special needs students.
5. Consult several alternative sources to enhance and update your knowledge of the current trends, issues, and processes related to the unit content.
6. Select exercises, drills, and other resources to use as supplemental materials for the unit.
7. Secure and prepare sufficient quantities of software backup diskettes for student use.
8. When appropriate, take a field trip or have a guest speaker present a portion of the unit describing industry standards.
9. Prepare appropriate bulletin boards and transparencies.
10. Make copies of appropriate handouts, activities, and test materials.
11. Secure overhead projector, LCD computer panel for data projection, and an appropriate screen.

General Classroom Preparations

1. Secure the students' attention.
2. Communicate learning expectations--goals to be accomplished.
3. Emphasize the value/importance of the unit content or activity.
4. Relate unit content to prior or future learning.
    a. Use discussions and pretests to determine prior knowledge of the unit content.
    b. From the results of the discussions and pretests, modify your teaching plans to fit student needs.
    c. Use enthusiasm, and relate the content to the student's interests.

Reteach Activities

1. Use a new method to reteach a unit activity.
2. Using additional resources, create individualized materials for the more and less capable students.
3. Utilize those sections of tests which need additional reinforcement.
4. Utilize unit activities not previously used.
5. Use peer practice for the reteaching of terminology--one student asks about the meaning of a word. The other student has the list of answers (words). Hints will be given until the word is matched with its correct definition.

Specific Teaching Activities

1. Design a bulletin board on:
    a. The five phases of a system analysis and design project
    b. Program specifications
    c. Files and databases
2. Invite a lead programmer to explain the responsibilities of his/her position to the class.
3. Invite a systems analyst to explain his/her job duties to the class.
4. Review and discuss objectives with the students.
5. Distribute terminology list and discuss terminology with the students.
6. Use the unit overview and additional sources to discuss unit information with your students.
7. Assign activities and problems from this guide to reinforce the procedures learned.

Activity Eleven

Prepare case situation(s) so that students can analyze user needs.

ANSWERS TO ACTIVITIES

Activity One

```
   ACCESSCONTROLS F
   L              I
 D G      BACKUPFILE
 A O SOURCE       E
 T R      N    I
CAPITALINVESTMENT
 D T U    F    P  Q
 I H D    I    U  U
 C M I  DATACAPTURE
 T   T            S
 I DATABASE       T
 O   R         S  I
 N  GANTTCHART Y  O
 A   I     B   S  N
 R   L  OBSERVATION
 Y         N   E  A
    U  FIXED   M  I
    S             R
   SECONDARYSTORAGE
    R
```

Activity Two

Answers will vary depending on teacher's lecture, and on the textbook used.

A *system analyst* is the person who coordinates schedules, communicates with those involved, and designs and develops systems which will be implemented on the computer system.

A *programmer/analyst* is the person who designs, codes, tests, and implements the programs for the computer system.

A *progamming team* is a group of programmers that conducts reviews of each member's designs and coding.

A *documentation specialist* is the person who gathers and organizes the facts about a program.

Activity Three

Answers will vary depending on the textbook used, and on the teacher's lecture, but they should include the following:

Phase 1--Feasibility study--the brief study or preliminary investigation of the problem.

Phase 2--Detailed investigation--gathering and then analyzing the data.

Phase 3--System design--consider the parts of the system, such as input and output requirements, files and databases, system processing, and system controls and backup.

Phase 4--System development--concerned with scheduling, programming, and documenting a system.

Phase 5--Implementation and evaluation--converting file and system, training, auditing, evaluation, and maintenance

Activities Four and Five

Answers will vary depending on the textbook used, and on the teacher's lecture. Evaluate the paper according to the criteria that you are emphasizing, but it should include the following:

Activity Six

Answers will vary depending on the textbook used, and on the teacher's lecture. Evaluate the paper according to the criteria that you are emphasizing. It should include the following points:

Step 1		**Organization information**
	Adv.	Good company goals, structure, and policies
	Dis.	No company goals, weak structure, out-dated or unclear policies
Step 2		**Employee information**
	Adv.	Each employee has a specific job title and description, and knows to whom to report.
	Dis.	Employee does not know hierarchy or chain of command, and is not clear on all job duties.
Step 3		**Job description information**
	Adv.	Employee knows work procedures, schedules, and is aware of performance criteria.
	Dis.	Employee is not sure of tasks, work schedules, or performance criteria.
Step 4		**Work environment information**
	Adv.	Good conditions, enough room for growth, and good location
	Dis.	Poor conditions, building too small, poor location
Step 5		**Questionnaires**
	Adv.	Questionnaires are used to survey large groups, and individuals can respond anonymously.
	Dis.	Questionnaires are sometimes never returned, and answers may be biased.
Step 6		**Interviews**
	Adv.	Interviews are flexible, and the interviewer can change the direction of his/her questions, observe the respondent's voice inflection and body motions, and establish rapport with clients.
	Dis.	Interviews are a time-consuming, expensive method of getting information, and the client may not be cooperative.
Step 7		**Observation**
	Adv.	The flow of data, how workers relate with each other, and how paper moves from desk to desk can be determined through observation.
	Dis.	One would need to observe more than once, and employees may be "acting."
Step 8		**Data analysis**
	Adv.	Data analysis ensures that work is being done effectively, and helps to develop data flow diagrams, and increase the work force.
	Dis.	Data analysis can result in high cost of reorganizing a department, and can reduce the workforce.

Activity Seven

Answers will vary depending on the textbook used, and on the teacher's lecture. Evaluate the paragraph according to the criteria that you are emphasizing.

Activity Eight

```
    TOPDOWN      T
      R    I     A S
FINALDOCUMENTATION U
L     C    T     G M
O MASTERFILE D F I M
W   E S    R E E B A
C   Q S    V TRAILER
H E U I    I A S E Y
A X E N    E I I   R
R C N G    W L B A E
T E T C        L R P
  P I O      L E C O
  TRAINING   O S H R
  I L T   M  G   I T
  O  TRANSACTION V
  N   O   S  C   A
    VALIDITY A   L
      S   E  L
          R
OPENENDED  PHYSICAL
```

COMPETENCY TEST ANSWERS

Part 1

1. N
2. F
3. M
4. V
5. T
6. W
7. L
8. K
9. Q
10. U
11. P
12. S
13. I
14. E
15. X
16. R
17. J
18. A
19. D
20. O

Part 2

A *systems analyst* is the person who coordinates schedules, communicates with those involved, and designs and develops systems which will be implemented on the computer system.

A *programmer/analyst* is the person who designs, codes, tests, and implements the programs for the computer system.

A *progamming team* is a group of programmers that conducts reviews of each member's designs and coding.

A *lead programmer* is the manager of all technical aspects of the project.

A *documentation specialist* is the person who gathers and organizes the facts about a program.

A *junior programmer* does programming duties assigned to him/her by his/her supervisor.

A *system analysis and design team* evaluates an existing system to determine how it works and meets user's needs, and develops a plan for a new or improved system based on the evaluation results.

Part 3

Phase 1--Feasibility study--the brief study or preliminary investigation of the problem.

Phase 2--Detailed investigation--gathering and then analyzing the data.

Phase 3--System design--consider the parts of the system, such as input and output requirements, files and databases, system processing, and system controls and backup.

Phase 4--System development--concerned with scheduling, programming, and documenting a system.

Phase 5--Implementation and evaluation--converting file and system, training, auditing, evaluation, and maintenance.

Part 4

Answers will vary depending on the textbook used, and on the teacher's lecture. Evaluate the answer according to the criteria that you are emphasizing.

Part 5

Answers will vary depending on the textbook used, and on the teacher's lecture. Evaluate the answer according to the criteria that you are emphasizing.

1. Purposes for the study--brief study of the problem
2. Technical feasibility--consideration of the hardware and software present and future.
3. Financial feasibility--what are the conversion costs, and are these costs justified with the benefits?
4. Operational feasibility--can the current staff perform the tasks? Will the current staff need additional training?
5. The scheduling feasibility--conversion schedule--training schedule.

Part 6

Answers will vary depending on the textbook used, and the teacher's lecture. Evaluate the paper according to the criteria that you are emphasizing.

Step 1 Organization information
Adv. Good company goals, structure, and policies
Dis. No company goals, weak structure, outdated or unclear policies

Step 2 Employee information
Adv. Each employee has a specific job title and job description, and knows to whom to report.
Dis. Employee does not know hierarchy or chain of command and is not clear on all job duties.

Step 3 Job description information
Adv. Employee knows work procedures, schedules, and is aware of performance criteria.
Dis. Employee is not sure of tasks, work schedules, or performance criteria.

Step 4 Work environment information
Adv. Good conditions, enough room for growth
Dis. Poor conditions, building too small, poor location.

Step 5 Questionnaires
Adv. Questionnaires are used to survey large groups, and individuals can respond anonymously.
Dis. Questionnaires are sometimes never returned, and answers may be biased.

Step 6 Interviews
Adv. Interviews are flexible, and the interviewer can change the direction of his/her questions, observe the respondent's voice inflection and body motions, and establish rapport with clients.
Dis. Interviews are a time consuming, expensive method of getting information, and the client may not be cooperative.

Step 7		Observation
	Adv.	The flow of data, how workers relate with each other, and how paper moves from desk to desk can be determined through observation.
	Dis.	One would need to observe more than once, and employees may be "acting."
Step 8		Data analysis
	Adv.	Data analysis ensures that work is being done effectively, and helps to develop data flow diagrams, and increase the work force.
	Dis.	Data analysis can result in high cost of reorganizing a department and can reduce the workforce.

Activity 7

Answers will vary depending on the textbook used and the teacher's lecture. Evaluate the paragraph on the criteria that you are emphasizing.

Additional Test Questions

Flat file/database comparison--
    A flat file is a single file which has no relationship to other files.
    A database is a collection of interrelated data stored together.
Advantage of using a flat file--
    Able to create a new flat file on an as-needed basis.
Disadvantage of using a flat file--
    Programs using flat files are dependent upon the format of the files.
Advantage of using a database--
    Data is stored together with a minimum of redundancy in order to serve multiple applications.
Disadvantage of using a database--
    Databases are built only after considerable investigation has been done.

Answers will vary depending on the textbook used, and on the teacher's lecture. Evaluate the paragraph according to the criteria that you are emphasizing.

SUGGESTED UNIT LESSON PLAN

SECTION I: SYSTEM DEVELOPMENT PROCESS

UNIT II: SYSTEM DEVELOPMENT

ESSENTIAL ELEMENT: 75.87 (h)(1)(A)

ALLOCATED TIME: 10 Hours

UNIT OBJECTIVE:	Students will summarize the steps of system development.
STUDENT OBJECTIVES:	After completing this unit, the student will be able to: 1. Discuss considerations in establishing a project plan 2. Use detailed programming specifications to design and write programs which fulfill the requirements of the system 3. List the steps involved in programming and testing the system 4. Discuss items that should be included in the system documentation
FOCUS:	As a project is being developed, one must understand the data to be processed, the procedures which must be implemented, and the schedule; otherwise, it is unlikely the project will be implemented on time.
DOMAINS:	Activities and competency tests have been designed to provide learning experiences utilizing the affective, cognitive, and/or psychomotor domains.
BASIC SKILLS:	Activities and competency tests have been designed to reinforce the basic skills of reading, writing, and/or mathematics.

CONTENT OUTLINE

- I. Establish a project plan
  - A. Time schedules
  - B. Tasks
  - C. Budget
- II. Programming specifications
  - A. Brief description of the system
  - B. System flowchart
  - C. Data flow diagram
  - D. Format of items to be created and processed
  - E. Database to be used
  - F. Detailed description of the processing within the program
- III. Programming and testing the system
  - A. Review the program specifications
  - B. Design the program
  - C. Code the program
  - D. Test the program
- IV. Documentation
  - A. Operations
    - 1. Input forms
    - 2. Output reports
    - 3. File layouts
    - 4. Record formats
    - 5. Descriptions of programs
    - 6. Other software that supports the present system
    - 7. Copies of policies and procedures for manual portion of system
    - 8. Data flow diagrams
  - B. Users
    - 1. Operation manuals
    - 2. Company guidelines
    - 3. Other specific documentation

SUGGESTED TEACHER ACTIVITIES

General Teacher Preparations

1. Preview the unit and review objectives.
2. Decide on a variety of instructional methods to present the unit.
3. Prepare questioning techniques and closure statements.
4. Make modifications in curriculum for special needs students.
5. Consult several alternative sources to enhance and update your knowledge of the current trends, issues, and processes related to the unit content.
6. Select exercises, drills, and other resources to use as supplemental materials for the unit.
7. Secure and prepare sufficient quantities of software backup diskettes for student use.
8. When appropriate, take a field trip or have a guest speaker present a portion of the unit describing industry standards.
9. Prepare appropriate bulletin boards and transparencies.
10. Make copies of appropriate handouts, activities, and test materials.
11. Secure overhead projector, LCD computer panel for data projection, and an appropriate screen.

General Classroon Preparations

1. Secure the students' attention.
2. Communicate learning expectations--goal(s) to be accomplished.
3. Emphasize the value/importance of the unit content or activity.
4. Relate unit content to prior or future learning.
    a. Use discussions and pretests to determine prior knowledge of the unit content.
    b. From the results of the discussions and pretests, modify your teaching plans to fit student needs.
    c. Use enthusiasm, and relate the content to the student's interests.

Reteach Activities

1. Use a new method to reteach a unit activity.
2. Using additional resources, create individualized materials for the more and less capable students.
3. Utilize those sections of tests which need additional reinforcement.
4. Utilize unit activities not previously used.
5. Use peer practice for the reteaching of terminology--one student asks about the meaning of a word. The other student has the list of answers (words). Hints will be given until the word is matched with its correct definition.

Specific Teaching Activities

Activity One

Project 1	Prepare a project for which a project plan will be developed. Obtain an example of a Gantt chart.

Activity Two

Project 2	Collect several well-constructed system program specifications.
Project 3	Collect several poorly constructed system program specifications.

Activity Three

Project 3	Develop a simple data flow diagram and system flowchart.
Project 4	Prepare a system flowchart.
Project 5	Prepare a data flow diagram.

Activity Four

Project 2	Collect literature about system documentation concepts, methods, and importance of system documentation.
Project 3	Obtain samples of good (complete) and bad (incomplete) system documentation.

ANSWERS TO ACTIVITIES

Activity One

Project 1 Time schedules, tasks, budget

Projects 2-3 Evaluated to the satisfaction of the instructor.

Activity Two

Project 1

1. Brief description of the system
2. System flowchart
3. Data flow diagram
4. Format of items to be created and processed
5. Database to be used
6. Detailed description of the processing within the program

Project 2 Evaluated to the satisfaction of the instructor.

Activity Three

Project 1

Discussion to be evaluated to the satisfaction of the instructor.

1. Review the program design specifications
2. Design the program
3. Code the program
4. Test the program

Projects 2-5 Evaluated to the satisfaction of the instructor.

Activity Four

Project 1

1. Input forms
2. Output reports
3. File layouts
4. Record formats
5. Descriptions of programs
6. Other software that supports the present system
7. Copies of policies and procedures for manual portion of system
8. Data flow diagrams
9. Operation manuals
10. Company guidelines
11. Other specific documentation

Projects 2-3 Evaluated to the satisfaction of the instructor.

COMPETENCY TEST ANSWERS

Part 1

Project 1 Time schedules, tasks, budget

Project 2 Evaluated to the satisfaction of the instructor.

Part 2 Discussion to be evaluated to the satisfaction of the instructor.
Four of the following:

1. Brief description of the system
2. System flowchart
3. Data flow diagram
4. Format of items to be created and processed
5. Database to be used
6. Detailed description of the processing within the program

Part 3

Project 1

Discussion to be evaluated to the satisfaction of the instructor.

1. Review the program design specifications
2. Design the program
3. Code the program
4. Test the program

Project 2 Evaluated to the satisfaction of the instructor.

Part 4

Five of the following:

1. Input forms
2. Output reports
3. File layouts
4. Record formats
5. Descriptions of programs
6. Other software that supports the present system
7. Copies of policies and procedures for manual portion of system
8. Data flow diagrams
9. Operation manuals
10. Company guidelines
11. Other specific documentation

SUGGESTED UNIT LESSON PLAN

SECTION I: SYSTEM DEVELOPMENT PROCESS

UNIT III: IMPLEMENTATION

ESSENTIAL ELEMENT: 75.87 (h)(1)(B)(4)((B)

ALLOCATED TIME: 10 Hours

UNIT OBJECTIVE: Students will summarize and identify components of the system implementation process.

STUDENT OBJECTIVES: After completing this unit, the student will be able to:

1. Describe the processes involved in system implementation
2. Explain a programmer's duties during implementation
3. Discuss problems encountered during implementation
4. Identify components and objectives of a systems test

FOCUS: The implementation process is the most exciting time of the project because it is the time when the new system replaces the old system, and all the people who worked on the project can see their work come to life. But the process is not as simple as replacing the old with the new. In this unit the student will learn about the individual tasks which must be done, and the planning which goes into a successful implementation of a new system, including testing the system before conversion.

DOMAINS: Activities and competency tests have been designed to provide learning experiences utilizing the affective, cognitive, and/or psychomotor domains.

BASIC SKILLS: Activities and competency tests have been designed to reinforce the basic skills of reading, writing, and/or mathematics.

CONTENT OUTLINE

- I. Implementation concepts
  - A. System test
  - B. User training
  - C. Operator training
  - D. JCL procedures
  - E. Conversion methods
  - F. On-going evaluation of new program (system)
- II. System testing
  - A. Definition and purpose
  - B. Special system tests
  - C. Testing libraries (sets of data)
- III. File conversion
  - A. Converting manual files
  - B. Converting old computer files
  - C. New files
- IV. System conversion methods
  - A. Why conversion is needed
  - B. Types of conversion methods
  - C. Monitoring conversions
- V. Evaluation
  - A. Evaluation against design specifications
  - B. Evaluation against user needs
- VI. Programmer's duties during implementation
  - A. Write reference manuals (user and operator)
  - B. Complete program documentation
  - C. Assist project leader and user in conversion
  - D. Review user evaluation; make changes
- VII. Problems encountered during implementation
  - A. User indifference.
  - B. Inadequate training of users and operators
  - C. Lack of helpful documentation
  - D. Poor conversion plan
  - E. Incomplete system definition and design
  - F. Changes in required design standards
- VIII. Maintenance
  - A. Purposes
  - B. Procedures

SUGGESTED TEACHER ACTIVITIES

General Teacher Preparations

1. Preview the unit and review objectives.
2. Decide on a variety of instructional methods to present the unit.
3. Prepare questioning techniques and closure statements.
4. Make modifications in curriculum for special needs students.
5. Consult several alternative sources to enhance and update your knowledge of the current trends, issues, and processes related to the unit content.
6. Select exercises, drills, and other resources to use as supplemental materials for the unit.
7. Secure and prepare sufficient quantities of software backup diskettes for student use.
8. When appropriate, take a field trip or have a guest speaker present a portion of the unit describing industry standards.
9. Prepare appropriate bulletin boards and transparencies.
10. Make copies of appropriate handouts, activities, and test materials.
11. Secure overhead projector, LCD computer panel for data projection, and an appropriate screen.

General Classroom Preparations

1. Secure the students' attention.
2. Communicate learning expectations--goal(s) to be accomplished.
3. Emphasize the value/importance of the unit content or activity.
4. Relate unit content to prior or future learning.
    a. Use discussions and pretests to determine prior knowledge of the unit content.
    b. From the results of the discussions and pretests, modify your teaching plans to fit student needs.
    c. Use enthusiasm, and relate the content to the student's interests.

Reteach Activities

1. Use a new method to reteach a unit activity.
2. Using additional resources, create individualized materials for the more and less capable students.
3. Utilize those sections of tests which need additional reinforcement.
4. Utilize unit activities not previously used.
5. Use peer practice for the reteaching of terminology--one student asks about the meaning of a word. The other student has the list of answers (words). Hints will be given until the word is matched with its correct definition.

Specific Teaching Activities

Activity Six	Students are asked to write letters inviting guest speakers. You may wish to give this assignment first and then schedule their visits around your lectures.
Activity Seven	This activity concerns preparing periodical abstracts. If you do not receive computer periodicals for your classroom, you may wish to make arrangements with your school library.

ANSWERS TO ACTIVITIES

Activity One

Areas to be covered will vary according to the depth of the teacher's lecture and the readings assigned: system test, user training, operator training, JCL procedures, conversion methods, evaluation

Activity Two

Accurate description of the following:

1. Write reference manuals.
2. Complete program documentation
3. Assist project leader and user in conversion
4. Review user evaluation; make changes

Activity Three

Four of the following:

1. User indifference
2. Inadequate training of users and operators
3. Lack of helpful documentation
4. Poor conversion plan
5. Incomplete system definition and design
6. Changes in required design standards

Activity Four

Project 1 Answers will vary depending on the teacher's lecture and on the textbook used. Evaluate according to the criteria that you are emphasizing.

Project 2

1. Peak load testing
2. Storage testing
3. Performance time testing
4. Recovery testing
5. Procedure testing
6. Human factors testing

Activity Five

Questions 1 and 2 Answers will vary depending on the teacher's lecture and on the textbook used. Evaluate according to the criteria that you are emphasizing.

Question 3 Direct, phased, pilot, and parallel. Descriptions should be worded to the satisfaction of the instructor.

Activities Six and Seven Evaluated to the satisfaction of the instructor.

COMPETENCY TEST ANSWERS

Part 1 and 2

Evaluated to the satisfaction of the instructor.

Part 3

Accurate description of the following:

1. Write reference manuals
2. Complete program documentation
3. Assist project leader and user in conversion
4. Review user evaluation; make changes

Part 4

Project 1

Accurate description of the following:

1. User indifference
2. Inadequate training of users and operators
3. Lack of helpful documentation
4. Poor conversion plan
5. Incomplete system definition and design
6. Changes in required design standards

Project 2 Answers will vary depending on the teacher's lecture and on the textbook used. Evaluate paragraph according to the criteria that you are emphasizing.

Part 5

Discussion of conversion methods evaluated to the satisfaction of the instructor.

SUGGESTED UNIT LESSON PLAN

SECTION I: SYSTEM DEVELOPMENT PROCESS

UNIT IV: USER DOCUMENTATION

ESSENTIAL 75.87
ELEMENT: (h)(1)(C)

ALLOCATED
TIME: 15 Hours

UNIT OBJECTIVE: Students will summarize the purpose of user documentation and content.

STUDENT OBJECTIVES: After completing this unit, the student will be able to:

1. Discuss the contents of well-written user documentation
2. Discuss methods used to encourage employees to use documentation and training materials
3. Write user documentation which describes how to use a simple system
4. Write a simple version of a user reference guide, and explain how a user training session would be conducted
5. Describe how user manuals are organized
6. Evaluate user reference materials and categorize them as to good/bad characteristics

FOCUS: As the system is being developed, team members write descriptive information about their work. As the project nears completion, these descriptions must be reshaped or rewritten so the end user can use them. Not all the details of the system are of importance to the user. Basically, the user wants to know how to use the system and the advantages of the system. The emphasis of this unit is to demonstrate how to write user documentation. Additionally, the unit will explore user documentation content, and the methods employed to train users.

DOMAINS: Activities and competency tests have been designed to provide learning experiences utilizing the affective, cognitive, and/or psychomotor domains.

BASIC SKILLS: Activities and competency tests have been designed to reinforce the basic skills of reading, writing, and/or mathematics.

CONTENT OUTLINE

- I. Type of user documentation
  - A. Manuals
  - B. One-page procedures (summary of important steps described in manual)
- II. Items included in user documentation
  - A. Layouts - output and input
  - B. Descriptions of all variables
  - C. Source of all variables to be entered by user
  - D. Step-by-step procedures for using system (hardware and software)
  - E. Error explanations and actions to be taken by user
  - F. Whom to call when help is needed
- III. How manuals are organized
  - A. Table of contents
  - B. Index
  - C. Tabbed sections
  - D. Summary of procedures for daily use
  - E. Error handling routines
- IV. Preparation of user documentation
  - A. Sequencing components described in III above
  - B. Page layout - good and bad techniques
  - C. Use of graphics
  - D. Walkthrough with user as documentation is developed
- V. Characteristics of good/bad manuals
  - A. Organization (or lack of it)
  - B. Poor indexing
  - C. Jargon vs. user-friendly writing

SUGGESTED TEACHER ACTIVITIES

General Teacher Preparations

1. Preview the unit and review objectives.
2. Decide on a variety of instructional methods to present the unit.
3. Prepare questioning techniques and closure statements.
4. Make modifications in curriculum for special needs students.
5. Consult several alternative sources to enhance and update your knowledge of the current trends, issues, and processes related to the unit content.
6. Select exercises, drills, and other resources to use as supplemental materials for the unit.
7. Secure and prepare sufficient quantities of software backup diskettes for student use.
8. When appropriate, take a field trip or have a guest speaker present a portion of the unit describing industry standards.
9. Prepare appropriate bulletin boards and transparencies.
10. Make copies of appropriate handouts, activities, and test materials.
11. Secure overhead projector, LCD computer panel for data projection, and an appropriate screen.

General Classroom Preparations

1. Secure the students' attention.
2. Communicate learning expectations--goal(s) to be accomplished.
3. Emphasize the value/importance of the unit content or activity.
4. Relate unit content to prior or future learning.
    a. Use discussions and pretests to determine prior knowledge of the unit content.
    b. From the results of the discussions and pretests, modify your teaching plans to fit the student needs.
    c. Use enthusiasm, and relate the content to the student's interests.

Reteach Activities

1. Use a new method to reteach a unit activity.
2. Using additional resources, create individualized materials for the more and less capable students.
3. Utilize those sections of tests which need additional reinforcement.
4. Utilize unit activities not previously used.
5. Use peer practice for the reteaching of terminology--one student asks about the meaning of a word. The other student has a list of the answers (words). Hints will be given until the word is matched with its correct definition.

Specific Teaching Activities

Activity Seven	Gather reference manuals. Copy selected pages and use as handouts. Collect examples of good and bad user documentation.

ANSWERS TO ACTIVITIES

Activity One

1. Layouts--output and input
2. Descriptions of all variables
3. Source of all variables to be entered by user
4. Step-by-step procedures for using system (hardware and software)
5. Error explanations and actions to be taken by user
6. Whom to call when help is needed

Activity Two

Answers will vary depending upon the textbook used and on the teacher's lecture. Evaluate the paragraph according to the criteria that you are emphasizing.

Activity Three

Evaluated to the satisfaction of the instructor.

Activity Four

Evaluated to the satisfaction of the instructor.

Activity Five

Answers will vary depending upon the students' background, research completed, and on the teacher's lecture. Evaluate the user procedures according to the criteria that you are emphasizing.

Activity Six

Answers will vary depending upon the textbook used and on the teacher's lecture. Evaluate the description according to the criteria that you are emphasizing.

Activity Seven

Evaluated to the satisfaction of the instructor.

COMPETENCY TEST ANSWERS

Part 1

Project 1 Manuals, one-page procedures (summary of important steps described in manuals)

Project 2

Any three of the following components will be acceptable:

1. Layouts--output and input
2. Descriptions of all variables
3. Source of all variables to be entered by user
4. Step-by-step procedures for using system (hardware and software)
5. Error explanations and actions to be taken by user
6. Whom to call when help is needed

Parts 2, 3, and 4

Answers will vary depending upon the textbook used and on the teacher's lecture. Evaluate answers according to the criteria that you are emphasizing.

Part 5

Accurate description of the following:

1. Table of contents
2. Index
3. Tabbed sections
4. Summary of procedures for daily use
5. Error handling routines

Part 6

Answers will vary depending upon the textbook used and on the teacher's lecture. Evaluate answers according to the criteria that you are emphasizing.

TERMINOLOGY

Abend	Abnormal ending.
Access Controls	Controls that limit physical access to computer sites, and that limit electronic access to computer systems.
Algorithm	A formula, or series of steps, for defining a problem and describing its solution.
Analysis	The process of examining and breaking down a system or situation into successively smaller elements for individual study and solution such as data, functioning, and processing.
Application Software	Predesigned software that directs the computer to perform specific tasks.
Archival File	File that has been processed and retained for special research or historic reference.
Audit Trail	Printed documents and computer- maintained records that can be used by auditors in tracing transactions through a system--from input source, to master file update, to output reports--for purposes of verification.
Backup File	Separately retained duplicate physical copy of a transaction file or historic master file, used for reconstruction and recovery of damaged or destroyed files.
Benefit	Favorable tangible or intangible result that offsets cost; savings or improvements that can be assigned values (either tangible or intangible) that can be balanced against cost as a basis for decision making.
Capital Investment	Financial resources committed by a business for the purchase of equipment or facilities.
Control Totals	A preprocessing count used on documents used for comparison to assure keyboarding accuracy and completeness of records.
Cost Analysis	Study and evaluation of a course of action, or proposed solution to a problem or need, that compares projected savings and other benefits to projected costs.
Cost-effective	Course of action that produces maximum relative benefit at minimum relative cost.
Data Capture	Procedures for initially recording and putting data into a system through keyboarding or other methods.

Data Dictionary	Alphabetic listing of terms and their definitions for all data items and data stores within a system.
Data Element	Basic unit of data that has a specific meaning of the system in which it is used.
Data Entry	Converting or transcribing source data into a form acceptable for computer processing.
Data Flow Diagrams	Graphic representation and analysis of the flow of data through an organization.
Database	A collection of data organized so that multiple files can be retrieved through a single reference, based upon relationships among records on the various files rather than through key values or physical position.
Detail Design	A subportion (phase) of the systems design that is planned in detail.
Direct File Processing	Allows user to go directly to record wanted using a record key, without computer having to read all preceding records in a file.
Documentation	The written detailed instructions on how to use a program and specific facts about this program.
Exception Report	Specially produced report indicating information that is identified to meet specified conditions and needs the attention of the management.
Feasibility Report	End result of a feasibility study. Includes recommendation for a specific course of action, description of the existing problem and anticipated changes, preliminary estimate of costs and benefits, impact statement detailing needed changes in equipment and facilities, proposed schedule for completion, and a list of policy level decisions to be resolved by management.
File	Collection of related records.
Final Documentation	Detailed report of systems development project after completion. Included are documentation of programs, processing, procedures, forms, and files to assist in solving day-to-day system operational problems or questions when the system is in operation.
Fixed Costs	Continuing costs involved in assuring the ongoing existence of a business enterprise that must be considered in any proposed systems development plan.
Gantt Chart	Graphic representation of a work project that is used to control schedules as part of project management.

Indexed Sequential	A random file arranged in sequential order, so a specific record can be located through an index or table.
Input	Data that is put into the computer system for processing or that trigger processing steps. Also, to access data and place them into a computer system. Input tasks include data capture, data entry, and input processing.
Intangible Benefit	Delivered, identifiable improvement that must by identified, and for which a value not easily quantified, must be ascribed.
Intangible Cost	In most cases readily identified, but not easily quantified, usually attributable to human reactions to changes in the work environment.
Interview	A data gatherer operation in system analysis.
Investigation Phase	Portion (phase) at the inception of the system's development life cycle to determine whether a full system development effort or another course of action is appropriate.
Logical Model	Model of CIS showing only logical necessary data content and handling to aid in documenting and/or analyzing a system.
Master File	File containing a permanent or semipermanent set of records that will be maintained over a considerable time period.
Observation	Method of gathering information utilizing a highly trained, qualified person who watches firsthand the actual processing associated with a system and records information and impressions of the process.
Open-ended Questions	Questionnaire item offering no response directions or specified options. Used to allow a wide variety of potential responses.
Organizational Structure	A formal recognition by the management of the makeup of the business organization. Reflects fundamental strategy for achievement of the organization's goals. Often represented by an organizational chart.
Payback Period	Length of time necessary to earn an amount equal to the amount required for acquisition of a capital investment.
Physical Model	Graphic representation of the processing activities in an information system, shown in sequence and reflecting all data transformations, file alterations, and outputs.
Procedures Manual	Instructional document written to aid people in performing manual procedures within a computer-based system.
Processing Controls	Controls designed to assure accuracy and completeness of records each time a file is processed.

Questionnaire	A method of data gathering used in system analysis as a source of information.
Schedule Feasibility	Evaluation that results from consideration of time available to complete a proposed course of action, to determine whether or not it can be implemented in the time available.
Secondary Storage	Storage separate from the CPU and memory that is used to store data and programs.
Sequential Access	Access technique to read from and write to records and files in an order determined by a logical identifier, or key, that is generally a data field within the record.
Simulation	The process of using computer modeling to reach decisions about real-life situations.
Software Package	Predesigned software for a specific application, available for purchase and ready for use (possible with minor modification) in an appropriate CIS; used in place of custom-designed software to reduce overall system costs or shorten development time.
Source Document	Original data source that contains information to be prepared as input to the computer.
Subsystem	A secondary or subordinate small system within a large system.
Summary Report	A report limited to totals and trends in a management information system. Used by middle-level managers for review of business activities.
System	An organized set of interrelated, interacting components that were established to perform a specific task.
System Flowcharts	Graphic representation that depicts the flow of data through a computer system.
System Life Cycle	Activities or conditions common to all computer information systems from inception to replacement: systems analysis, systems design and development, implementation and obsolescence.
Systems Analysis	The process of applying a systems approach to study an existing system to find out how it works.
Systems Analyst	A person who acts as a problem solving specialist who plans and designs individual programs and how the whole computer system works.
Systems Approach	Way of identifying and viewing component parts and functions as integral elements of a whole system.

Systems Development	Programming and testing process used to bring a new system into being.
Tangible Benefit	A benefit realized when a new system makes or saves money for its organization.
Tangible Cost	Cost of equipment or human factors associated with the operation of a system.
Technical Feasibility	Evaluation that results from technical consideration of available computer hardware and software capability to carry out a proposed course of action.
Top-Down Design	Design technique that identifies basic program functions before dividing into subfunctions called modules.
Trailer Record	Last record in a file, containing totals for all numeric fields in all records in the file. Compared with field totals each time the files processed.
Training manual	An easy-to-use reference manual that teaches novice users how to learn to perform procedures within a computer based information system.
Transaction File	Collection of records containing updated changes, additions, deletion, revisions made to the master file.
User Specification	User-oriented report presenting a complete model of a new CIS for user evaluation and approval. Can include data flow diagrams, description of system inputs and outputs, performance requirements, security and control requirements, design and implementation constraints, and unresolved policy considerations that must be dealt with before the system can be implemented.
Validity	Description of transaction or data to indicate they are authorized, that transactions actually took place, and that data really exist.

SECTION I: SYSTEM DEVELOPMENT PROCESS

UNIT I: SYSTEM ANALYSIS AND DESIGN

UNIT OBJECTIVE:

Students will demonstrate comprehension of the system analysis and design process.

STUDENT OBJECTIVES:

After completing this unit, the student will be able to:

1. Define and use system analysis terminology
2. Describe the role of each system's team member
3. List in order the five phases of the system analysis and design process
4. Discuss the importance of the goals and outcome of system analysis and design
5. Describe the five aspects of the feasibility study and explain their part in the overall process
6. Discuss the scope and meaning of the detailed investigation
7. Identify and define each step of the design phase.

GENERALIZATION:

System analysis and design is a people-oriented process requiring understanding about the needs and concerns of others. Students are generally quick to recognize that systems analysts need to mix a strong technical background with strong human relations skills while working to solve the end-users' problem.

UNIT OVERVIEW

I. Introduction to system analysis and design terminology
  A. Definition of terms
  B. Use of terminology in proper context

II. Job description of key team members
  A. Systems analyst and programmer/analyst
  B. The programming team
  C. The documentation specialist

III. Goals and results of the five phases of a system analysis and design project
  A. Goals and results of the feasibility study
  B. Goals and results of the detailed investigation
  C. Goals and results of the system design
  D. Goals and results of the system development
  E. Goals and results of the implementation and evaluation

IV. The feasibility study
  A. Purposes for the study
  B. Technical feasibility
    1. Hardware considerations
    2. Software considerations
  C. Financial feasibility
    1. Conversion costs
    2. Cost vs. benefits

D. Operational feasibility
  1. Tasks performed by current staff
  2. Additional staff training

E. Scheduling feasibility
  1. Conversion schedule
  2. Training schedule

F. Feasibility report
  1. Narrative explanation of the project
  2. Cost estimates
  3. Description of expected changes
  4. Proposed schedule for completion
  5. Problem definition

V. Detailed investigation/data gathering

A. Organization information
  1. Company goals
  2. Company structure
  3. Company policies

B. Employee information
  1. Job duties
  2. Authority lines
  3. Interpersonal relationships

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C. Job description information
   1. Tasks and work flow
   2. Work procedures
   3. Work schedules and loads
   4. Performance criteria
   5. Control mechanisms

D. Work environment information
   1. Ergonomics
   2. Available resources

E. Questionnaires
   1. Advantages and disadvantages
   2. Validity
   3. Reliability
   4. Open-ended questions
   5. Fill-in-the-blank questions
   6. Multiple choice questions
   7. Rating scales

F. Interviews (Structured and Unstructured)
   1. Advantages and disadvantages
   2. Preparation
   3. Conducting the interview
   4. Follow-up activities

G. Observation
  1. Advantages and disadvantages
  2. Scheduled
  3. Unscheduled

H. Data analysis
  1. Tangible costs
  2. Tangible benefits
  3. Intangible costs
  4. Intangible benefits
  5. Payback analysis
  6. Data flow diagrams
  7. Estimating costs

VI. Systems design component

A. The programming team
  1. The lead programmer
  2. The junior programmer
  3. The programmer/analyst
  4. The librarian

B. System flow document
  1. Data flow diagrams
    a. Symbols used
    b Purpose of data flow diagram

2. System flow charts

a. Symbols used

b. Purpose of system flowchart

3.. Relation of system flow documents to program development

C. Program specifications

1. Output requirements--report layouts

a. Types of forms

1) Inhouse reports

2) Printed documents distributed outside of company (paychecks, invoices, formal reports)

b. Print chart

1) Size

2) Indicating variables, constants

2) Number of lines shown

c. Types of report lines

1) Headings

2) Detail

3) Summary lines

4) Total lines

5) Information lines

6) Control totals to operator, user

d. Good report facts vs. hard-to-understand layouts

2. Screen design
    a. Screen layout form
    b. Types of information displayed--data, messages, response prompts
    c. Factors to consider
        1) Cursor
        2) Labels on variables
        3) Amounts of data on one screen
        4) Highlighting
        5) Color
    d. Menu design
    e. Good factors in screen design vs. hard-to-understand displays
    f. Computer-to-user dialogue
3. Input requirements
    a. Medium
    b. Capture points
    c. Content
    d. Validation
    e. Volume
4. Files and databases
    a. Files vs. databases
        1) Stand-alone vs. integrated data files
        2) Advantages vs. disadvantages
        3) Costs of each
        4) Complexities of each

2. System flow charts
    a. Symbols used
    b. Purpose of system flowchart
3.. Relation of system flow documents to program development

C. Program specifications

1. Output requirements--report layouts
    a. Types of forms
        1) Inhouse reports
        2) Printed documents distributed outside of company (paychecks, invoices, formal reports)
    b. Print chart
        1) Size
        2) Indicating variables, constants
        2) Number of lines shown
    c. Types of report lines
        1) Headings
        2) Detail
        3) Summary lines
        4) Total lines
        5) Information lines
        6) Control totals to operator, user
    d. Good report facts vs. hard-to-understand layouts

2. Screen design
    a. Screen layout form
    b. Types of information displayed--data, messages, response prompts
    c. Factors to consider
        1) Cursor
        2) Labels on variables
        3) Amounts of data on one screen
        4) Highlighting
        5) Color
    d. Menu design
    e. Good factors in screen design vs. hard-to-understand displays
    f. Computer-to-user dialogue
3. Input requirements
    a. Medium
    b. Capture points
    c. Content
    d. Validation
    e. Volume
4. Files and databases
    a. Files vs. databases
        1) Stand-alone vs. integrated data files
        2) Advantages vs. disadvantages
        3) Costs of each
        4) Complexities of each

- b. File structures
  - 1) Sequential
  - 2) Direct (relative)
  - 3) Indexed
- c. Access methods
  - 1) Sequential
  - 2) Random
- d. File types
  - 1) Master
  - 2) Transaction
  - 3) Archival
  - 4) Backup
- e. Record structures
  - 1) Logical records
  - 2) Variables (fields) alpha and numeric
  - 3) Groups and elements
  - 4) Fixed and variable length records
- f. Database concepts
  - 1) Integration of data
  - 2) Views to user

5. System controls
   - a. Source documents security
   - b. Backup schedules
   - c. General security procedures
6. Processes (algorithms) needed to produce outputs from given inputs

VII. System Development

  A. Schedule

  B. Programming

  C. Testing

  D. Documentation

VIII. Implementation and evaluation

  A. File Conversion

  B. Training

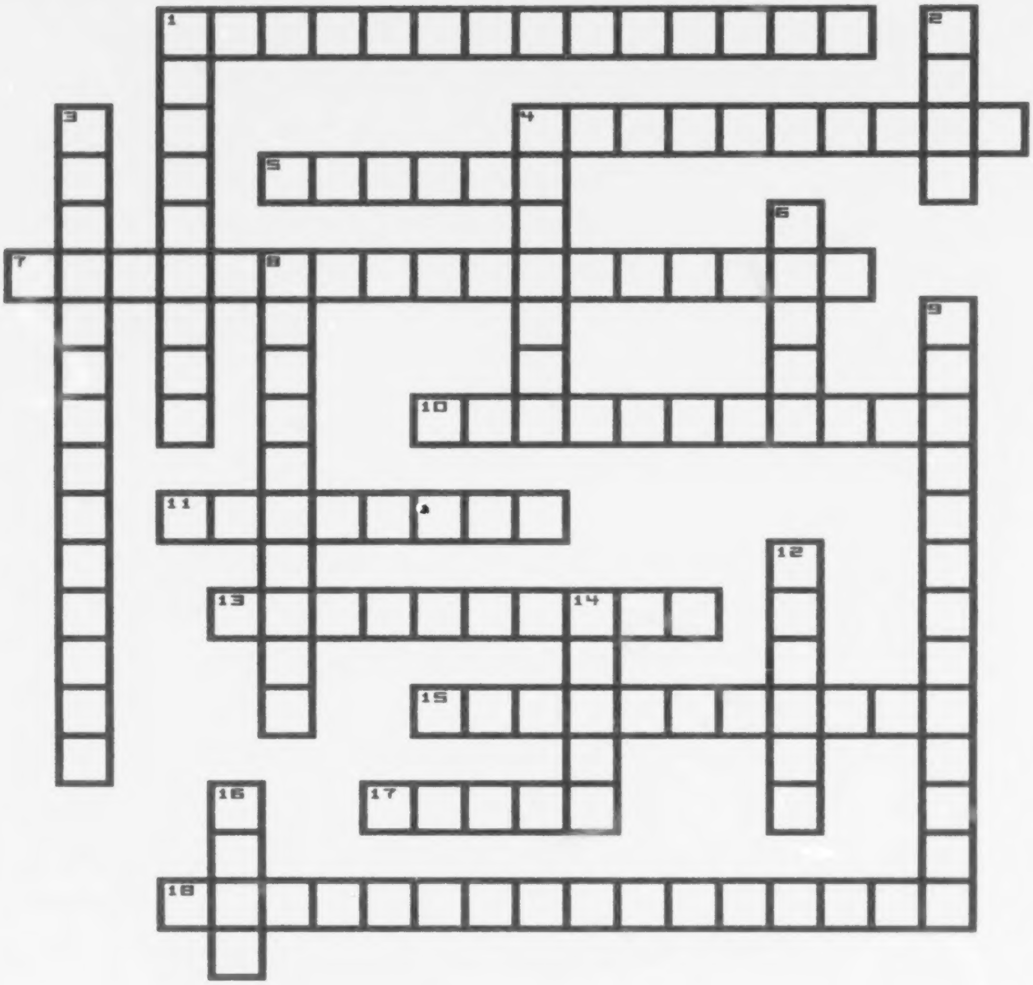
  C. System Conversion

  D. Auditing

  E. Evaluation

  F. Maintenance

TERMINOLOGY CROSSWORD PUZZLE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TERMINOLOGY CROSSWORD PUZZLE CLUES

ACROSS CLUES

1. Controls that limit physical access to computer sites.
4. Used for reconstruction and recovery of damaged or destroyed files.
5. Original data document that contains information to be prepared as input to the computer.
7. Financial resources committed by a business for the purchase of equipment of facilities.
10. Procedures for initially recording and putting data into a system through keyboarding.
11. Data organized so that multiple files can be retrieved with a single reference.
13. Graphic representation of work project that is used to control schedules.
15. Method of gathering information.
17. Continuing costs involved in assuring the ongoing existence of a business enterprise.
18. Storage separate from the CPU and memory that is used to store data and programs.

DOWN CLUES

1. A formula or series of steps, for defining a problem and describing its solution.
2. Collection of related records.
3. Alphabetic listing of terms and their definitions for all data items and data storage in system.
4. Favorable results that offset the cost.
6. Data that is put into the computer system for processing.
8. Printed documents and computer-maintained records used by auditors to trace transactions.
9. A method of data gathering used in system analysis as a source of information.
12. An organized set of interrelated, interacting components organized to perform a specific task.
14. An error in a program.
16. A special orientation report presenting a complete model of a new CIS for user evaluation.

TASKS THE SYSTEM ANALYSIS AND DESIGN MEMBERS PERFORM

INSTRUCTIONS: **Describe tasks that the following team members perform:**

Systems analyst

Programmer/analyst

Programming team

Documentation specialist

FIVE PHASES OF THE SYSTEM ANALYSIS AND DESIGN PROCESS

INSTRUCTIONS: List below and briefly describe the five phases of the system analysis and design process.

PHASE 1 ____________________

PHASE 2 ____________________

PHASE 3 ____________________

PHASE 4 ____________________

PHASE 5 ____________________

IMPORTANCE OF THE GOALS AND OUTCOMES OF SYSTEM ANALYSIS AND DESIGN

INSTRUCTIONS: Type a one page paper that describes and discusses the importance of the goals and outcome of system analysis and design from your reading and your lecture notes. Make sure that you use correct grammar, complete sentences, and correct spelling.

FIVE ASPECTS OF THE FEASIBILITY STUDY

INSTRUCTIONS: From your lecture notes and readings, type a one page paper describing the five aspects of the feasibility study and explain their part in the overall process.

ADVANTAGES AND DISADVANTAGES OF THE EIGHT STEPS FOR DATA GATHERING

INSTRUCTIONS: **List the eight steps for data gathering and discuss the advantages and disadvantages of each.**

STEP 1.

Advantages:

Disadvantages:

STEP 2.

Advantages:

Disadvantages:

STEP 3.

Advantages:

Disadvantages:

STEP 4.

Advantages:

Disadvantages:

STEP 5.

Advantages:

Disadvantages:

STEP 6.

Advantages:

Disadvantages:

STEP 7.

Advantages:

Disadvantages:

STEP 8.

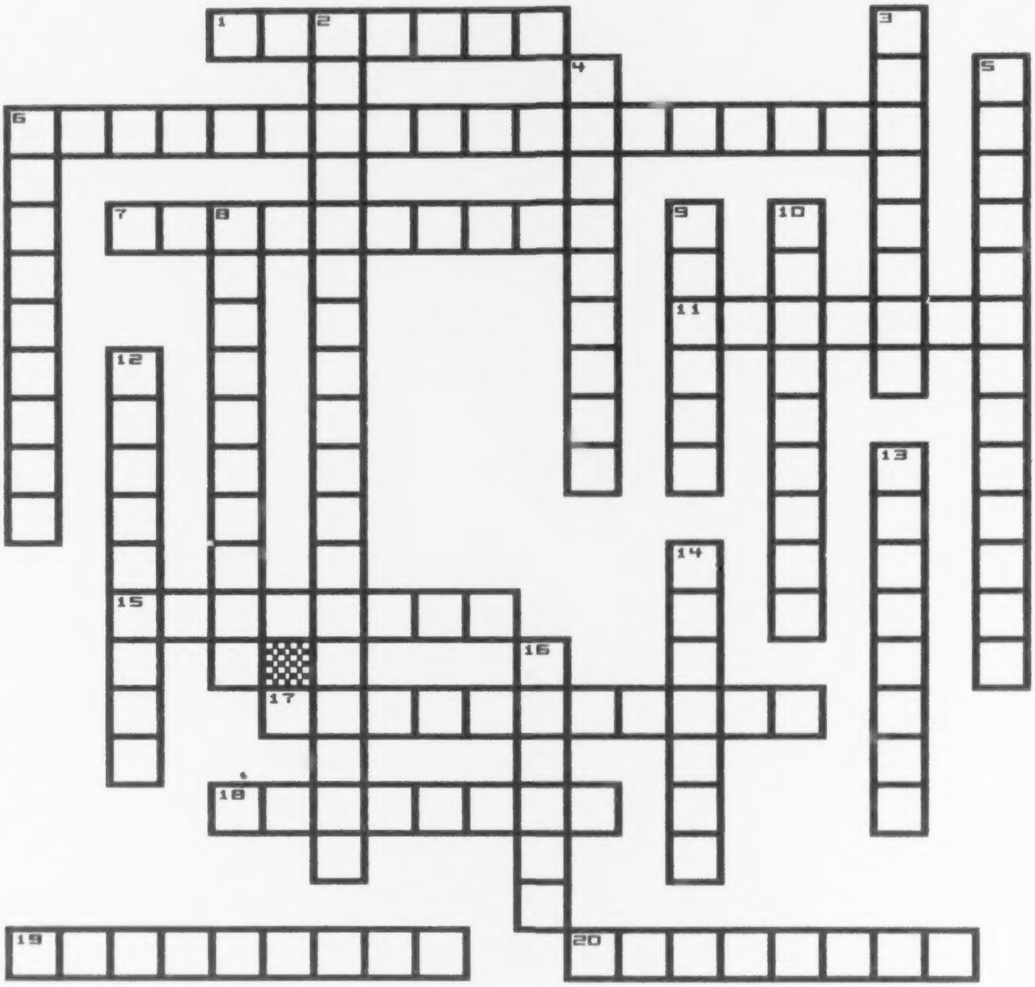
Advantages:

Disadvantages:

IDENTIFICATION OF SYSTEMS DESIGN COMPONENTS

INSTRUCTIONS: From your readings and lecture notes, briefly describe and define each of the components in the system design phase.

TERMINOLOGY CROSSWORD PUZZLE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TERMINOLOGY CROSSWORD PUZZLE CLUES

ACROSS CLUES

1. Design technique that identifies basic program functions before dividing into subfunctions/model.

6. Detailed report of systems development project after completion.

7. File containing a permanent or semipermanent set of records.

11. Last record in a file, containing totals for all numeric fields in all records in the file.

15. Easy-to-use reference manual that teaches novice users how to learn to perform procedures.

17. File containing a collection of records containing updated changes, additions, deletions.

18. Description of transaction or data to indicate they are authorized, and that data exist.

19. Questionnaire item offering no response directions or specified options.

20. Graphic representation of the processing activities in an information system.

DOWN CLUES

2. Controls designed to assure accuracy and completeness of records each time file processed.

3. Cost of equipment or human factors associated with the operation of a system.

4. A data gathering operation in system analysis.

5. A report limited to totals and trends in a management information systems.

6. Graphic representation that depicts the flow of data through a computer system.

8. Reading from and writing to records and files in an order based on a logical identifier.

9. A subportion (phase) of the systems design that is planned in detail.

10. To determine whether or not it can be implemented in the time available.

12. Specially produced report indicating information identified to meet specified conditions.

13. File that has been processed and retained for special research or historic reference.

14. Model of CIS showing only logical necessary data content and handling.

16. File containing a permanent or semipermanent set of records that will be maintained.

COMPETENCY TEST

PART I: TERMINOLOGY FOR SYSTEM ANALYSIS AND DESIGN

INSTRUCTIONS: **Match the terms on the next page to the definitions below by placing the correct letter in the blank at the left.**

______ 1. Audit trail

______ 2. Validity

______ 3. Training manual

______ 4. Questionnaire

______ 5. Logical model

______ 6. System analyst

______ 7. Documentation

______ 8. Input

______ 9. Database

______ 10. Physical model

______ 11. Systems development

______ 12. Top-down design

______ 13. Feasibility report

______ 14. Investigative phase

______ 15. System flowchart

______ 16. System life cycle

______ 17. Data entry

______ 18. Trailer record

______ 19. Processing controls

______ 20. System

a. Contains the totals for all numeric fields in all records in the file.

b. Predesigned software that directs the computer to perform specific tasks.

c. Data that is put into the computer system for processing.

d. Controls designed to assure accuracy and completeness of records each time a file is processed.

e. Phase used to determine whether a full system development effort is appropriate.

f. Indicates that the transaction is authorized and that the data really exist.

g. Course of action that produces maximum relative benefit at minimum relative cost.

h. Specially produced report indicating information that is identified to meet specified conditions and needs the attention of the management.

i. Includes recommendation for a specific course of action.

j. Converting or transcribing source data into a form acceptable for computer.

k. Procedures for initially recording and putting data into a system through keyboarding or other methods.

l. Detailed instructions on how to use a program and specific facts about a program.

m. An easy-to-use reference that teaches the novice users how to learn to perform computer procedures.

n. Records that can be used by auditors in tracing transactions through a system.

o. Organized set of interrelated, interacting components established to perform a specific task.

p. Processes used to bring a new system into being.

q. A collection of data organized so the multiple files can be retrieved through a single reference.

r. Conditions common to all computer information systems from inception to replacement.

s. Technique that identifies basic program functions before dividing into subfunctions called modules.

t. Shows only the logical necessary data content and handling.

u. Graphic representation of the processing activities in an information system.

v. Method of data gathering used in system analysis as a source of information.

w. Person who acts as a problem solving specialist, who plans and designs individual programs, and is familar with the complete computer system.

x. Graphic representation that depicts the flow of data through a computer system.

PART II: ROLE OF SYSTEM TEAM MEMBERS

INSTRUCTIONS: **Explain the role of any five of the following members of the system analyst personnel team:**

Systems analyst

Programmer/analyst

Programming team

Lead Programmer

Documentation specialist

Junior programmer

System analysis and design team

PART III: FIVE PHASES OF THE SYSTEM ANALYSIS AND DESIGN PROCESS

INSTRUCTIONS: List the five phases of the system analysis and design process. Describe any three of them.

PHASE 1

PHASE 2

PHASE 3

PHASE 4

PHASE 5

PART IV: IMPORTANCE OF THE GOALS AND OUTCOMES OF SYSTEM ANALYSIS AND DESIGN

INSTRUCTIONS: Summarize in two or three paragraphs the importance of the goals and outcomes of system analysis and design.

PART V: FIVE ASPECTS OF THE FEASIBILITY STUDY

INSTRUCTIONS: **List the five aspects of the feasibility study and describe in detail any three parts.**

1.

2.

3.

4.

5.

PART VI: ADVANTAGES AND DISADVANTAGES OF THE EIGHT STEPS FOR DATA GATHERING.

INSTRUCTIONS: List in order the eight steps for data gathering and discuss any five of them.

STEP 1.

STEP 2.

STEP 3.

STEP 4.

STEP 5.

STEP 6.

PART VI: (continued)

STEP 7.

STEP 8.

PART VII: IDENTIFICATION OF SYSTEM DESIGN COMPONENTS

INSTRUCTIONS: Write a short paragraph describing each of the system design components.

ADDITIONAL TEST QUESTIONS

Differentiate between flat files and databases and give an advantage and disadvantage for each.

Flat file/database comparison:

Advantage of using a flat file

Disadvantage of using a flat file

Advantage of using a database

Disadvantage of using a database

Describe what makes a screen design good and bad.

List one principle of good screen design and describe one design flaw to avoid.

COMPETENCY CHECKLIST

ESSENTIAL ELEMENT: 75.87(h)(1)(A)

The student will be provided opportunities to: demonstrate a comprehension of the system development process.

OBJECTIVE: Students will demonstrate comprehension of the system analysis and design process.	MASTERY	NON MASTERY
1. Define and use system analysis terminology.	______	______
2. Describe the role of each system's team member.	______	______
3. List in order the five phases of the system analysis and design process.	______	______
4. Discuss the importance of the goals and outcome of system analysis and design.	______	______
5. Describe the five aspects of the feasibility study and explain their part in the overall process.	______	______
6. Discuss the scope and meaning of the detailed investigation.	______	______
7. Identify and define each step of the design phase.	______	______
	______	______
	______	______

STUDENT NAME ______________________________

SECTION I: SYSTEM DEVELOPMENT PROCESS

UNIT II: SYSTEM DEVELOPMENT

UNIT OBJECTIVE

Students will summarize the steps of system development.

STUDENT OBJECTIVES

After completing this unit, the student will be able to:

1. Discuss considerations in establishing a project plan
2. Use detailed programming specifications to design and write programs which fulfill the requirements of the system
3. List the steps involved in programming and testing the system
4. Discuss items that should be included in the system documentation

GENERALIZATION:

As a project is being developed, one must understand the data to be processed, the procedures which must be implemented, and the schedule; otherwise, it is unlikely the project will be implemented on time.

UNIT OVERVIEW

I. Establish a project plan
  A. Time schedules
  B. Tasks
  C. Budget

II. Programming specifications
  A. Brief description of the system
  B. System flowchart
  C. Data flow diagram
  D. Format of items to be created and processed
    1. Input
    2. Output
    3. Files
  E. Database to be used
    1. Format
    2. Content
  F. Detailed description of the processing within the program

III. Programming and testing the system
  A. Review the program design specifications
  B. Design the program
  C. Code the program

D. Test the program
  1. Individual modual testing
    a. Syntactical errors
    b. Logical errors
    c. Test data
      1) Valid
      2) Invalid
  2. System testing
    a. Users interact with system
      1) Screen layout
      2) Prompts
      3) Distribution of reports produced
    b. User responses to the system

IV. Documentation
  A. Operations
    1. Input forms
    2. Output reports
    3. File layouts
    4. Record formats
    5. Descriptions of programs
    6. Other software that supports the present system
    7. Copies of policies and procedures for manual portion of system
    8. Data flow diagrams

B. Users

1. Operation manuals
2. Company guidelines
3. Other specific documentation

PROJECT PLAN

Project 1

INSTRUCTIONS: List considerations in establishing a project plan.

Project 2

INSTRUCTIONS: Develop a project plan for the activity that is provided by the instructor. Be sure to include a time schedule, a list of tasks, and a budget.

Project 3

INSTRUCTIONS: Examine a sample Gantt-type progress report. Give a status report of what tasks are completed, what tasks are in progress, and those tasks yet to be initiated.

PROGRAM SPECIFICATIONS

Project 1

INSTRUCTIONS: **List six items that may be included in program specifications.**

1.

2.

3.

4.

5.

6.

Project 2

INSTRUCTIONS: **Examine several complete, well-constructed system program specifications for different types of applications provided by your teacher.**

Project 3

INSTRUCTIONS: **Examine at least one poorly-constructed, incomplete system program specification. List any questions raised by the missing information.**

PROGRAM TESTING

Project 1

INSTRUCTIONS: Discuss the steps involved in programming and testing.

Project 2

INSTRUCTIONS: Write a memo to a fictional user requesting a meeting to clarify output reports.

Project 3

INSTRUCTIONS: Examine and compare simple data flow diagrams and system flowcharts.

Project 4

INSTRUCTIONS: Given a system flowchart, write a description of system flow.

Project 5

INSTRUCTIONS: Given a data flow diagram, write a paragraph to explain the system flow represented by the diagram.

DOCUMENTATION

Project 1

INSTRUCTIONS: List the items that should be included in the final documentation of a system.

Project 2

INSTRUCTIONS: Read literature about system documentation concepts, methods, and the importance of system documentation. Select an article and write a summary of its major points. Be prepared to share your findings orally with the class.

Project 3

INSTRUCTIONS: Examine samples of complete and incomplete system documentation. Compare what is missing in the incomplete documentation with the full information given in the complete system documentation.

COMPETENCY TEST

PART I: PROJECT PLAN

Project 1

INSTRUCTIONS: List three considerations in establishing a project plan.

1.

2.

3.

Project 2

INSTRUCTIONS: Given a project assignment provided by your teacher, breakdown the project into specific tasks.

PART II: PROGRAM SPECIFICATIONS

INSTRUCTIONS: Discuss four items that are included in program specifications.

PART III: PROGRAMMING AND TESTING

Project 1

INSTRUCTIONS: List the steps involved in programming and testing a system.

Project 2

INSTRUCTIONS: Discuss the differences between a data flow diagram and a system flowchart.

PART IV: DOCUMENTATION

INSTRUCTIONS: **List five items that are included in final system documentation.**

1.

2.

3.

4.

5.

COMPETENCY CHECKLIST

ESSENTIAL ELEMENT: 75.87(h)(1)(A)

The student will be provided opportunities to: demonstrate a comprehension of the system development process.

OBJECTIVE:	Students will summarize the steps of system development.	MASTERY	NON MASTERY
1.	Discuss considerations in establishing a project plan.	_____	_____
2.	Use detailed programming specifications to design and write programs which fulfill the requirements of the system.	_____	_____
3.	List the steps involved in programming and testing the system.	_____	_____
4.	Discuss items that should be included in the system documentation.	_____	_____
		_____	_____
		_____	_____
		_____	_____

STUDENT NAME ______________________________

SECTION I: SYSTEM DEVELOPMENT PROCESS

UNIT III: IMPLEMENTATION

UNIT OBJECTIVE:

Students will summarize and identify components of the system implementation process.

STUDENT OBJECTIVES:

After completing this unit, the student will be able to:

1. Describe the processes involved in system implementation.
2. Explain a programmer's duties during implementation.
3. Discuss problems encountered during implementation.
4. Identify components and objectives of a system test.

GENERALIZATION:

The implementation process is the most exciting time of the project because it is the time when the new system replaces the old system, and all the people who worked on the project can see their work come to life. But the process is not as simple as replacing the old with the new. In this unit the student will learn about the individual tasks which must be done, and the planning which goes into the successful implementation of a new system, including testing the system before conversion.

UNIT OVERVIEW

I. Implementation concepts
  A. System test
  B. User training
    1. Benefits
    2. Components
  C. Operator training
  D. JCL procedures
  E. Conversion methods
  F. On-going evaluation of new program (system)
    1. Importance
    2. Using evaluation

II. System testing
  A. Definition and purpose
  B. Special system tests
    1. Peak load testing
    2. Storage testing
    3. Performance time testing
    4. Recovery testing
    5. Procedure testing
    6. Human factors testing
  C. Testing libraries (sets of data)

III. File conversion
    A. Converting manual files
    B. Converting old computer files
    C. New files
IV. System conversion methods
    A. Why conversion is needed
    B. Types of conversion methods
        1. Direct
        2. Phased
        3. Pilot
        4. Parallel
    C. Monitoring conversions
V. Evaluation
    A. Evaluation against design specifications
    B. Evaluation against user needs
VI. Programmer's duties during implementation
    A. Write reference manuals (user and operator)
    B. Complete program documentation
    C. Assist project leader and user in conversion
    D. Review user evaluation; make changes
VII. Problems encountered during implementation
    A. User indifference
    B. Inadequate training of users and operators
    C. Lack of helpful documentation
    D. Poor conversion plan
    E. Incomplete system definition and design

F. Changes in required design standards

1. Government agencies
2. Company itself

VIII. Maintenance

A. Purposes

B. Procedures

SYSTEM IMPLEMENTATION PROCESSES

INSTRUCTIONS: From your reading and your lecture notes, list and briefly describe the processes involved in system implementation.

PROGRAMMER'S DUTIES DURING IMPLEMENTATION

INSTRUCTIONS: **List and describe the four main duties that a programmer has during the implementation process.**

1.

2.

3.

4.

PROBLEMS ENCOUNTERED DURING IMPLEMENTATION

INSTRUCTIONS: From your reading and lecture notes, list and discuss any four of six of the problems encountered during implementation.

1.

2.

3.

4.

SYSTEM TESTING

Project 1

INSTRUCTIONS: Define and give the purpose of the system testing procedure.

Project 2

INSTRUCTIONS: List and describe each of the special system tests.

1.

2.

3.

4.

5.

6.

CONVERSIONS

INSTRUCTIONS:

1. **Define the term "evaluation" as it relates to system goals.**

2. **Define the term "maintenance" as it relates to on-going debugging and enhancement of computer systems.**

3. **List and describe the four conversion methods.**

   A.

   B.

   C.

   D.

SUGGESTED REQUEST FOR GUEST SPEAKERS

INSTRUCTIONS: **Under the direction of your teacher, the class should work as a team to compose a letter for each of the following speakers and topics. Make sure that your teacher has approved the letter, and that it has been proofread. After the speaker's presentation has been made, make sure you send a thank you note.**

Invite a programmer to class to discuss how his/her company implements a new program (system).

Invite a user to describe program implementation from a user viewpoint.

Invite a programmer to describe how his/her company maintains a system.

PERIODICAL ABSTRACTS

INSTRUCTIONS: Read literature about program (system) implementation and system testing. Select one article about each topic and prepare an abstract for each.

COMPETENCY TEST

PART I: SYSTEM IMPLEMENTATION PROCESSES

Project 1

INSTRUCTIONS: List the steps in system implementation in the proper sequence.

Project 2

INSTRUCTIONS: Describe the processes involved in system implementation.

PART II: SYSTEM TESTING

Project 1

INSTRUCTIONS: List the components of a system test.

Project 2

INSTRUCTIONS: Explain two objectives of system testing.

1.

2.

PART III: PROGRAMMER'S DUTIES

INSTRUCTIONS: Describe the responsibilities that a programmer has during the implementation process.

PART IV: PROBLEMS OCCURRING DURING IMPLEMENTATION

Project 1

INSTRUCTIONS: Describe problems that may be encountered during implementation.

Project 2

INSTRUCTIONS: Write a paragraph identifying at least two hazards involved in system implementation.

1.

2.

PART V: FILE CONVERSIONS

INSTRUCTIONS: Explain the following conversion method and give their pros and cons.

1. direct

pro

con

2. phased

pro

con

3. pilot

pro

con

4. parallel

pro

con

COMPETENCY CHECKLIST

ESSENTIAL ELEMENT: 75.87(h)(1)(B) and (h)(4)(B)

The student will be provided opportunities to: demonstrate a comprehension of the implementation process and understand the process of implementing a system into production status.

OBJECTIVE:	Students will summarize and identify components of the system implementation process.	MASTERY	NON MASTERY
1.	Describe the processes involved in system implementation.	____	____
2.	Explain a programmer's duties during implementation.	____	____
3.	Discuss problems encountered during implementation.	____	____
4.	Identify components and objectives of a system test.	____	____
		____	____
		____	____

STUDENT NAME ______________________________

SECTION I: SYSTEM DEVELOPMENT PROCESS

UNIT IV: USER DOCUMENTATION

UNIT OBJECTIVES:

Students will summarize the purpose of user documentation and content.

STUDENT OBJECTIVES:

After completing this unit, the student will be able to:

1. Discuss the contents of well-written user documentation.
2. Discuss methods used to encourage employees to use documentation and training materials.
3. Write user documentation which describes how to use a simple system.
4. Write a simple version of a user reference guide, and explain how a user training session would be conducted.
5. Describe how user manuals are organized.
6. Evaluate user reference materials and categorize them as to good/bad characteristics.

GENERALIZATION:

As the system is being developed, team members write descriptive information about their work. As the project nears completion, these descriptions must be reshaped or rewritten so the end user can use them. Not all details of the system are of importance to the user. Basically, the user wants to know how to use the system and the advantages of the system. The emphasis of this unit is to demonstrate how to write user documentation. Additionally, the unit will explore user documentation content, and the methods employed to train users.

UNIT OVERVIEW

I. Type of user documentation

  A. Manuals

  B. One-page procedures (summary of important steps described in manual)

II. Items included in user documentation

  A. Layouts - output and input

  B. Descriptions of all variables

  C. Source of all variables to be entered by user

  D. Step-by-step procedures for using system (hardware and software)

  E. Error explanations and actions to be taken by user

  F. Whom to call when help is needed

III. How manuals are organized

  A. Table of contents

  B. Index

  C. Tabbed sections

  D. Summary of procedures for daily use

  E. Error handling routines

IV. Preparation of user documentation

  A. Sequencing components described in III above

  B. Page layout - good and bad techniques

  C. Use of graphics

  D. Walkthrough with user as documentation is developed

V. Characteristics of good/bad manuals

  A. Organization (or lack of it)

  B. Poor indexing

  C. Jargon vs user-friendly writing

COMPONENTS OF USER DOCUMENTATION

INSTRUCTIONS: **List all the essential components included in user documentation.**

1.

2.

3.

4.

5.

6.

PURPOSES OF DOCUMENTATION

INSTRUCTIONS: Write a summary paragraph describing the overall purposes of user documentation.

USER DOCUMENTATION FOR A SIMPLE SYSTEM

Project 1

INSTRUCTIONS: Write brief, step-by-step explanations of daily tasks such as washing the clothes, driving to school, etc.

Project 2

INSTRUCTIONS: Write a brief, step-by-step explanation of how to turn on a computer, retrieve a program, and run the program.

DESCRIPTION OF A USER TRAINING SESSION

INSTRUCTIONS: Write a brief outline explaining how a user training session would be conducted.

STEP-BY-STEP TASK DESCRIPTION

INSTRUCTIONS: Given a brief paragraph about a task completed with a computer, write a one-page set of user procedures describing step-by-step tasks.

ORGANIZATION OF USER MANUALS

INSTRUCTIONS: From your reading and lecture notes, describe how user manuals are organized.

EVALUATING REFERENCE MANUALS

INSTRUCTIONS: **Evaluate the portions of reference manuals provided by your teacher as to their good/bad characteristics.**

Manual 1:

Organization:

Indexing:

Writing style:

Overall evaluation:

EVALUATING REFERENCE MANUALS

INSTRUCTIONS: **Evaluate the portions of reference manuals provided by your teacher as to their good/bad characteristics.**

Manual 2:

Organization:

Indexing:

Writing style:

Overall evaluation:

COMPETENCY TEST

PART I: COMPONENTS OF USER DOCUMENTATION

Project 1

INSTRUCTIONS: Identify the different types of user documentation.

Project 2

INSTRUCTIONS: List three essential components of user documentation.

1.

2.

3.

PART II: IMPORTANCE OF USER DOCUMENTATION IN THE IMPLEMENTATION SYSTEM

INSTRUCTIONS: Defend this statement: User documentation is a critical factor in the implementation process.

PART III: COMPLETING A TASK USING USER DOCUMENTATION

INSTRUCTIONS: Using the sample user documentation provided by your teacher, correctly demonstrate how to perform the requested task.

PART IV: PROCEDURES FOR CONDUCTING A USER TRAINING SESSION

INSTRUCTIONS: Write the documentation for a simple procedure provided by your teacher. Using the documentation, successfully show another student how to run the procedure on the computer.

PART V: ORGANIZATION OF USER MANUALS

INSTRUCTIONS: Describe how user manuals are organized.

PART VI: EVALUATION AND CATEGORIZATION OF CHARACTERISTICS OF USER MANUALS

Project 1

INSTRUCTIONS: **Identify at least two reasons why some manuals are harder to use than others.**

1.

2.

Project 2

INSTRUCTIONS: **Using the documentation samples provided by your teacher, evaluate their good/bad characteristics. Include how the bad characteristics of the documentation could be improved.**

Organization:

Indexing:

Writing style:

Overall evaluation:

COMPETENCY CHECKLIST

ESSENTIAL ELEMENT: 75.87(h)(1)(C)

The student will be provided opportunities to: develop user documentation.

OBJECTIVE: Students will summarize the purpose of user documentation and content.	MASTERY	NON MASTERY
1. Discuss the contents of well-written user documentation.	____	____
2. Discuss methods used to encourage employees to use documentation and training materials.	____	____
3. Write user documentation which describes how to use a simple system.	____	____
4. Write a simple version of a user reference guide, and explain how a user training session would be conducted.	____	____
5. Describe how user manuals are organized.	____	____
6. Evaluate user reference materials and categorize them as to good/bad characteristics.	____	____
	____	____
	____	____
	____	____
	____	____

STUDENT NAME ______________________________

SECTION II

DOCUMENTATION AND MAINTENANCE

ESSENTIAL ELEMENT

75.87(h)(4)

Concepts and skills associated with software implementation and maintenance.

The student shall be provided opportunities to:

A. write documentation for maintaining a system;

B. understand the process of implementing a system into production status; and

C. develop an understanding of the programmer responsibilities in program maintenance.

SUGGESTED UNIT LESSON PLAN

SECTION II: DOCUMENTATION AND MAINTENANCE

UNIT I: DOCUMENTATION

ESSENTIAL ELEMENT: 75.87 (h)(4)(A)

ALLOCATED TIME: 15 Hours

UNIT OBJECTIVE: Students will describe the importance of program documentation components.

STUDENT OBJECTIVES: After completing this unit, the student will be able to:

1. Identify the four types of documentation
2. Name at least three benefits of documentation
3. Explain the importance of documentation and of following company guidelines when creating documentation
4. Describe the importance of embedding documentation within a program and of following company guidelines when embedding documentation

FOCUS: Documentation is the key component in managing a computer system once it is installed. When documentation follows company guidelines, it provides a way to:

1. review a system
2. modify a system
3. provide continuity for a system regardless of personnel changes
4. alleviate communication problems among programmers, operators, and the user departments

DOMAINS: Activities and competency tests have been designed to provide learning experiences utilizing the affective, cognitive, and/or psychomotor domains.

BASIC SKILLS: Activities and competency tests have been designed to reinforce the basic skills of reading, writing, and/or mathematics.

CONTENT OUTLINE

I. Types of documentation
    A. Systems flow documentation
    B. Program documentation
    C. User documentation
    D. Operation documentation
II. Benefits of documentation
    A. Firm control over resources by providing a system of checks and balances
    B. Possible reduction in operating costs through more effective ultilization of resources
    C. Means of measuring the effectiveness of operation or organization by applying a realistic performance standard
    D. Simplification of the process of training personnel
    E. Quality and accuracy in operations and user organization by clearly defining what output and/or results are desired
    F. Elimination of dependence upon individuals in an operation or organization
III. Program documentation
    A. Program documentation components
    B. Documentation tools
    C. Company guidelines
    D. Importance of program documentation
    E. Embedded (internal) program documentation

SUGGESTED TEACHER ACTIVITIES

General Teacher Preparations

1. Preview the unit and review objectives.
2. Decide on a variety of instructional methods to present the unit.
3. Prepare questioning techniques and closure statements.
4. Make modifications in curriculum for special needs students.
5. Consult several alternative sources to enhance and update your knowledge of the current trends, issues, and processes related to the unit content.
6. Select exercises, drills, and other resources to use as supplemental materials for the units.
7. Secure and prepare sufficient quantities of software backup diskettes for student use.
8. When appropriate, take a field trip or have a guest speaker present a portion of the unit describing industry standards.
9. Prepare appropriate bulletin boards and transparencies.
10. Make copies of appropriate handouts, activities, and test materials.
11. Secure overhead projector, LCD computer panel for data projection, and an appropriate screen.

General Classroom Preparations

1. Secure the students' attention.
2. Communicate learning expectations--goals to be accomplished.
3. Emphasize the value/importance of the unit content or activity.
4. Relate unit content to prior or future learning.
    a. Use discussions and pretests to determine prior knowledge of the unit content.
    b. From the results of the discussions and pretests, modify your teaching plans to fit student needs.
    c. Use enthusiasm, and relate the content to the student's interests.

Reteach Activities

1. Use a new method to reteach a unit activity.
2. Using additional resources, create individualized materials for the more and less capable students.
3. Utilize those sections of tests which need additional reinforcement.
4. Utilize unit activities not previously used.
5. Use peer practice for the reteaching of terminology--one student asks about the meaning of a word. The other student has the list of answers (words). Hints will be given until the word is matched with its correct definition.

Specific Teaching Activities

1. Use documentation gathered for Part 1 on the Competency Test.
2. Collect system, program, user, and operation documentation for this unit of study.
3. Have students gather company guidelines on documentation.
4. Collect examples of programs with good and bad internal documentation.

ANSWERS TO ACTIVITIES

Activity One

Project 1

1. Systems flow documentation
2. Program documentation
3. User documentation
4. Operation documentation

Project 2

1. Operations
2. Program/system
3. System
4. User
5. program
6. program

Activity Two

1. Firm control over resources by providing a system of checks and balances
2. Possible reduction in operating costs through more effective utilization of resources
3. Means of measuring the effectiveness of operation or organization by applying a realistic performance standard
4. Simplification of the process of training personnel
5. Quality and accuracy in operations and user organization by clearly defining what output and/or results are desired
6. Elimination of dependence upon individuals in an operation or organization

Activity Three

Project 1

1. Life cycle of program
2. Program maintenance
3. Updating documentation
4. Audit trail of program changes

Description to be evaluated to the satisfaction of the instructor.

Project 2

1. How guidelines are determined
2. Where to locate standards
3. How to interpret guidelines
4. Why guidelines vary from company to company

Explanation to be evaluated to the satisfaction of the instructor.

Activity Four

Project 1

Accurate descriptions of the following:

1. Comment boxes used as labels
2. Comments describing how processes work
3. Comments documenting program changes
4. Comments summarizing program specifications

Project 2

Discussion should include the following:

1. Language rules for comments
2. Use of asterisks to highlight comments
3. Use of blank lines, ejecting to new page for easy reading of source code

Project 3

Discussion should include the following:

1. How guidelines are determined
2. Where to locate standards
3. How to interpret guidelines
4. Why guidelines vary from company to company

COMPETENCY TEST ANSWERS

Part 1

Answers will vary depending upon the documentation samples provided, the textbooks used, and on the teacher's lecture. Evaluate according to the criteria that you are emphasizing.

Part 2

Three of the following:

1. Firm control over resources by providing a system of checks and balances
2. Possible reduction in operating costs through more effective utilization of resources
3. Means of measuring the effectiveness of operation or organization by applying a realistic performance standard
4. Simplification of the process of training personnel
5. Quality and accuracy in operations and user organization by clearly defining what output and/or results are desired
6. Elimination of dependence upon individuals in an operation or organization

Parts 3 and 4

Answers will vary depending upon the documentaiton samples provided, the textbooks used, and on the teacher's lecture. Evaluate according to the criteria that you are emphasizing.

SUGGESTED UNIT LESSON PLAN

SECTION II: DOCUMENTATION AND MAINTENANCE

UNIT II: PROGRAM MAINTENANCE (MODIFICATION)

ESSENTIAL ELEMENT: 75.87 (h)(4)(C)

ALLOCATED TIME: 10 Hours

UNIT OBJECTIVE: Student will be able to summarize the components of program maintenance, and use these components to modify a program.

STUDENT OBJECTIVES: After completing this unit, the student will be able to:

1. Identify and explain the four types of maintenance programming
2. Determine changes to be made to an existing program that the user has requested to be modified
3. Follow company guidelines when creating documentation for program modification
4. Use top-down testing concepts when modifying an existing program
5. Create valid and invalid data records and test program modifications

FOCUS: A program often goes through many modifications during its life-cycle. Programmers must have a systematic plan for implementing changes as requested and checking the results.

DOMAINS: Activities and competency tests have been designed to provide learning experiences utilizing the affective, cognitive, and/or psychomotor domains.

BASIC SKILLS: Activities and competency tests have been designed to reinforce the basic skills of reading, writing, and/or mathematics.

CONTENT OUTLINE

- I. Four types of maintenance programming
  - A. Problem maintenance
  - B. Routine maintenance
  - C. Special reporting requests enhancements
  - D. System improvements
- II. Steps to follow in designing changes of existing program
  - A. Read existing program documentation
  - B. Determine changes in data structures
  - C. Determine changes in output layouts
  - D. Determine changes in procedural statements, modules
  - E. Devise test plan
  - F. Use test data to debug changes in program
  - G. Rewrite user and operator procedures
  - H. Change documentation
- III. Programmer's duties during modification
  - A. Identify statements in existing program which need changing
  - B. Code changes
  - C. Insert new statements
  - D. Test and debug changes
  - E. Rewrite documentation
- IV. Procedures to modify program code
  - A. Pull up old program
  - B. Locate places for change
  - C. Use text editor to make changes
  - D. Compile modified code
  - E. Debug syntax errors
- V. Documentation for program modification
  - A. Steps to follow in documenting changes of existing programs
  - B. Programmer's duties in modifying documentation
  - C. Company guidelines
- VI. Testing program modifications
  - A. What to test for when testing program modifications
  - B. Constructing a test plan
  - C. Top-down testing

SUGGESTED TEACHER ACTIVITIES

General Teacher Preparations

1. Preview the unit and review objectives.
2. Decide on a variety of instructional methods to present the unit.
3. Prepare questioning techniques and closure statements.
4. Make modifications in curriculum for special needs students.
5. Consult several alternative sources to enhance and update your knowledge of the current trends, issues, and processes related to the unit content.
6. Select exercises, drills, and other resources to use as supplemental materials for the unit.
7. Secure and prepare sufficient quantities of software backup diskettes for student use.
8. When appropriate, take a field trip or have a guest speaker present a portion of the unit describing industry standards.
9. Prepare appropriate bulletin boards and transparencies.
10. Make copies of appropriate handouts, activities, and test materials.
11. Secure overhead projector, LCD computer panel for data projection, and an appropriate screen.

General Classroom Preparations

1. Secure the students' attention.
2. Communicate learning expectations--goal(s) to be accomplished.
3. Emphasize the value/importance of the unit content or activity.
4. Relate unit content to prior or future learning.
    a. Use discussions and pretests to determine prior knowledge of the unit content.
    b. From the results of the discussions and pretests, modify your teaching plans to fit student needs.
    c. Use enthusiasm, and relate the content to the student's interests.

Reteach Activities

1. Use a new method to reteach a unit activity.
2. Using additional resources, create individualized materials for the more and less capable students.
3. Utilize those sections of tests which need additional reinforcement.
4. Utilize unit activities not previously used.
5. Use peer practice for the reteaching of terminology--one student asks about the meaning of a word. The other student has the list of answers (words). Hints will be given until the word is matched with its correct definition.

Specific Teaching Activities

Activity Two

Project 2	Prepare a program for the students to call up and modify.
Project 3	Request that students modify a program written by another student.

Activity Four

Project 2	Prepare a simple program and sample data records for the students to "play computer" and answer questions.
Project 3	Collect several modification test plans for various programs for use in this project.

Activity Five

Project 1	Prepare a program for use in this project, and provide the students with test data.
Project 2	Prepare an input data layout so that students can produce valid and invalid data records.
Project 3	Develop instructions for students to modify and test another student's program.

Competency Test

Part 1

Project 1	Develop user requests for change.

Part 2

Project 2	Create changes for a program for distribution to students.
Project 3	Develop an original and modified version of a program, including output.

Part 5	Develop the modifications for a program.

ANSWERS TO ACTIVITIES

Activity One

Project 1

Description of the following to be evaluated to the satisfaction of the instructor

1. Problem maintenance
2. Routine maintenance
3. Special reporting requests enhancements
4. System improvements

Project 2

1. Read existing program documentation
2. Determine changes in data structures
3. Determine changes in output layouts
4. Determine changes in procedural statements, modules
5. Devise test plan
6. Use test data to debug changes in program
7. Rewrite user and operator procedures
8. Change documentation

Project 3

1. Pull up old program
2. Locate places for change
3. Use text editor to make changes
4. Compile modified code
5. Debug syntax errors

Activity Two

Project 1 Answers will vary depending upon the textbook used, and on the teacher's lecture. Evaluate according to the criteria that you are emphasizing.

Project 2 Answers will vary depending upon the program(s) provided, the textbook used, and on the teacher's lecture. Evaluate according to the criteria that you are emphasizing.

Project 3 Evaluated to the satisfaction of the instructor.

Activity Three

Project 1

1. Read existing program documentation
2. Determine changes in data structures
3. Determine changes in output layouts
4. Determine changes in procedural statements and modules
5. Modify existing documentation to reflect changes
6. Go over changes with users/operators

Project 2

Description of the following to be evaluated to the satisfaction of the instructor.

1. Determine company guidelines
2. Locate company standards
3. Interpret guidelines
4. Follow procedure for audit trail of program changes

Activity Four

Project 1

1. Report/screen layout matches specifications
2. Calculations are correct
3. All possible error conditions are handled properly
4. All records are processed

Projects 2 - 3 Evaluated to the satisfaction of the instructor.

Activity Five

Projects 1 - 3 Evaluated to the satisfaction of the instructor.

COMPETENCY TEST ANSWERS

Part 1

Project 1

Answers will vary depending upon the textbook used, and on the teacher's lecture.

1. Problem maintenance
2. Routine maintenance
3. Special reporting requests enhancements
4. System improvements

Matching answers will depend on the user requests for change provided by the instructor.

Project 2

1. Read existing program documentation
2. Determine changes in data structures
3. Determine changes in output layouts
4. Determine changes in procedural statements, modules
5. Devise test plan
6. Use test data to debug changes in program
7. Rewrite user and operator procedures
8. Change documentation

Part 2

Project 1

Answers will vary depending upon the textbook used, and on the teacher's lecture. Evaluate according to the criteria that you are emphasizing.

Projects 2 - 3

Evaluated to the satisfaction of the instructor.

Part 3

Descriptions will vary depending upon the teacher's lecture, and on the textbook used. Evaluate according to the criteria that you are emphasizing.

1. Determine company guidelines
2. Locate company standards
3. Interpret guidelines
4. Follow procedure for audit trail of program changes

Part 4

1. Report/screen layout matches specifications
2. Calculations are correct
3. All possible error conditions are handled properly
4. All records are processed

Part 5 Answers will vary depending upon the textbook used, and on the teacher's lecture. Evaluate according to the criteria that you are emphasizing.

SECTION II: DOCUMENTATION AND MAINTENANCE

UNIT I: DOCUMENTATION

UNIT OBJECTIVE:

Students will be able to describe the importance of program documentation components.

STUDENT OBJECTIVES:

After completing this unit, the student will be able to:

1. Identify the four types of documentation.
2. Name at least three benefits of documentation.
3. Explain the importance of documentation and of following company guidelines when creating documentation.
4. Describe the importance of embedding documentation within a program and of following company guidelines when embedding documentation.

GENERALIZATION:

Documentation is the key component in managing a computer system once it is installed. When documentation follows company guidelines, it provides a way to:

1. review a system.
2. modify a system.
3. provide continuity for a system regardless of personnel changes.
4. alleviate communication problems among programmers, operators, and the user departments.

UNIT OVERVIEW

I. Types of documentation
    A. Systems flow documentation
    B. Program documentation
    C. User documentation
    D. Operation documentation

II. Benefits of documentation
    A. Firm control over resources by providing a system of checks and balances
    B. Possible reduction in operating costs through more effective utilization of resources
    C. Means of measuring the effectiveness of operation or organization by applying a realistic performance standard
    D. Simplification of the process of training personnel
    E. Quality and accuracy in operations and user organization by clearly defining what output and/or results are desired
    F. Elimination of dependence upon individuals in an operation or organization

III. Program documentation
    A. Program documentation components
        1. Program specifications
        2. Design tools
            a. Hierarchy charts
            b. IPO
            c. Flowcharts
            d. Pseudocode
        3. Source listing with embedded documentation comments
        4. Output results
        5. Audit trail of program maintenance

B. Documentation tools
    1. Hand-prepared
    2. Computer-aided
    3. Software packages for preparing documentation

C. Company guidelines
    1. How guidelines are determined
    2. Where to locate standards
    3. How to interpret guidelines
    4. Why guidelines vary from company to company

D. Importance of program documentation
    1. Life cycle of program
    2. Program maintenance
    3. Updating documentation
    4. Audit trail of program changes

E. Embedded (internal) program documentation
    1. Types of embedded (internal) program documentation
        a. Comment boxes used as labels
        b. Comments describing how processes work
        c. Comments documenting program changes
        d. Comments summarizing program specifications
    2. Comment techniques
        a. Language rules for comments
        b. Use of asterisks to highlight comments
        c. Use of blank lines, ejecting to new page for easy reading of source code

3. Company guidelines for embedded (internal) documentation
    a. How guidelines are determined
    b. Where to locate standards
    c. How to interpret guidelines
    d. Why guidelines vary from company to company

4. Importance of embedded (internal) documentation
    a. Life cycle of program
    b. Program maintenance
    c. Updating documentation
    d. Audit trail of program changes
    e. No separate book or manual to locate

TYPES OF DOCUMENTATION

Project 1

INSTRUCTIONS: List the four types of documentation.

1.

2.

3.

4.

Project 2

INSTRUCTIONS: Given a list of documentation components, identify the type of documentation (system, use, program, operation) each represents.

1.	A listing in the log book	1.
2.	Hierarchy charts	2.
3.	System flowchart	3.
4.	Run sheet instructions	4.
5.	IPO	5.
6.	Flowcharts	6.

BENEFITS OF PROGRAM DOCUMENTATION

INSTRUCTIONS: **Identify and describe six benefits of documentation.**

1.

2.

3.

4.

5.

6.

IMPORTANCE OF DOCUMENTATION

Project 1

INSTRUCTIONS: List and describe why program documentation is important.

Project 2

INSTRUCTIONS: Explain the role that company guidelines play in the program documentation process.

EMBEDDED DOCUMENTATION

Project 1

INSTRUCTIONS: Describe the four types of embedded program documentation.

1.

2.

3.

4.

Project 2

INSTRUCTIONS: Discuss the techniques of commenting.

Project 3

INSTRUCTIONS: Discuss the types of company guidelines that are considered for embedded documentation.

COMPETENCY TEST

PART I: TYPES OF DOCUMENTATION

INSTRUCTIONS: From the samples of documentation your teacher has provided, identify the documentation category each represents.

1.

2.

3.

4.

5.

6.

PART II: BENEFITS OF DOCUMENTATION

INSTRUCTIONS: Give at least three reasons why good documentation is essential.

1.

2.

3.

PART III: IMPORTANCE OF DOCUMENTATION

Project 1

INSTRUCTIONS: Your teacher will provide you with good program documentation. Identify each component of the documentation.

Project 2

INSTRUCTIONS: Explain, in your own words, why documentation is important.

PART IV: EMBEDDED DOCUMENTATION

Project 1

INSTRUCTIONS: Explain the advantages of working with a progam with good embedded program documentation.

Project 2

INSTRUCTIONS: Create complete program documentation for a program.

COMPETENCY CHECKLIST

ESSENTIAL ELEMENT: 75.87 (h)(4)(A)

The student will be provided opportunities to: write documentation for maintaining a system.

OBJECTIVE: Students will be able to describe the importance of program documentation components.	MASTERY	NON MASTERY
1. Identify the four types of documentation.	______	______
2. Name at least three benefits of documentation.	______	______
3. Explain the importance of documentation and of following company guidelines when creating documentation.	______	______
4. Describe the importance of embedding documentation within a program and of following company guidelines when embedding documentation.	______	______
	______	______
	______	______

STUDENT NAME: ______________________

SECTION II: DOCUMENTATION AND MAINTENANCE

UNIT II: PROGRAM MAINTENANCE (MODIFICATION)

UNIT OBJECTIVE:

Students will be able to summarize the components of program maintenance, and use these components to modify a program.

STUDENT OBJECTIVES:

After completing this unit, the student will be able to:

1. Identify and explain the four types of maintenance programming.
2. Determine changes to be made to an existing program that the user has requested to be modified.
3. Follow company guidelines when creating documentation for program modification.
4. Use top-down testing concepts when modifying an existing program.
5. Create valid and invalid data records and test program modifications.

GENERALIZATION:

A program often goes through many modifications during its life-cycle. Programmers must have a systematic plan for implementing changes as requested and checking the results.

UNIT OVERVIEW

- I. Four types of maintenance programming
  - A. Problem maintenance
  - B. Routine maintenance
  - C. Special reporting requests enhancements
  - D. System improvements
- II. Steps to follow in designing changes of existing program
  - A. Read existing program documentation
  - B. Determine changes in data structures
  - C. Determine changes in output layouts
  - D. Determine changes in procedural statements, modules
  - E. Devise test plan
  - F. Use test data to debug changes in program
  - G. Rewrite user and operator procedures
  - H. Change documentation
- III. Programmer's duties during modification
  - A. Identify statements in existing program which need changing
  - B. Code changes
  - C. Insert new statements
  - D. Test and debug changes
  - E. Rewrite documentation
- IV. Procedures to modify program code
  - A. Pull up old program
  - B. Locate places for change
  - C. Use text editor to make changes

D. Compile modified code

E. Debug syntax errors

V. Documentation for program modification

A. Steps to follow in documenting changes of existing programs

1. Read existing program documentation
2. Determine changes in data structures
3. Determine changes in output layouts
4. Determine changes in procedural statements and modules
5. Modify existing documentation to reflect changes
6. Go over changes with users/operators

B. Programmer's duties in modifying documentation

1. Collect necessary source listings, test runs, record layouts
2. Organize changes in external documentation
3. Be sure that code contains embedded documentation reflecting changes
4. Be sure that all changes reflect the name of programmer making changes and the date changes were made

C. Company guidelines

1. Determine company guidelines
2. Locate company standards
3. Interpret guidelines
4. Follow procedure for audit trail of program changes

VI. Testing program modifications

A. What to test for when testing program modifications

1. Report/screen layout matches specifications
2. Calculations are correct
3. All possible error conditions are handled properly

4. All records are processed

B. Constructing a test plan

1. Decide what needs to be tested
2. Construct data records to test aspects of program
3. Play computer with each data record, and write down what record should produce as output

C. Top-down testing

1. Create test data (valid records)
2. Code and test one change at a time using valid data
3. Incrementally add more changes--code and test
4. Create test data (invalid records)
5. Add error trapping procedures--code and test

PROGRAM MAINTENANCE (MODIFICATION)

Project 1

INSTRUCTIONS: Describe four types of program maintenance (modification).

1.

2.

3.

4.

Project 2

INSTRUCTIONS: List the steps used when modifying a program.

1.

2.

3.

4.

5.

6.

7.

8.

Project 3

INSTRUCTIONS: Prepare a list of modification activities in proper sequence.

MODIFYING AN EXISTING PROGRAM

Project 1

INSTRUCTIONS: Describe two pitfalls to be avoided when modifying an existing program.

1.

2.

Project 2

INSTRUCTIONS: Call up the program(s) prepared by your teacher, and modify it (them) in ways such as: adding more variables, changing column headings, adding total lines, validating fields, or making new version changes to the compiler.

Project 3

INSTRUCTIONS: Take an existing program prepared by another student, and modify it in the ways described in Project 2.

CREATING DOCUMENTATION ACCORDING TO COMPANY GUIDELINES

Project 1

INSTRUCTIONS: List the steps a programmer follows when documenting program modifications.

1.

2.

3.

4.

5.

6.

Project 2

INSTRUCTIONS: Describe how to determine company guidelines, standards, and audit procedures.

TOP-DOWN TESTING CONCEPTS

Project 1

INSTRUCTIONS: List the changes to a program which need to be tested.

Project 2

INSTRUCTIONS: Using a simple program and sample data records provided by your teacher, play computer, and answer questions that illustrate various test conditions of program modification.

Project 3

INSTRUCTIONS: Examine several modification test plans for various programs.

TESTING PROGRAM MODIFICATION

Project 1

INSTRUCTIONS: Examine already-created test data for a program selected by your teacher, and explain how the output would look for each record.

Project 2

INSTRUCTIONS: From the input data layout supplied by your teacher, work with team members to produce five (5) valid records and three (3) invalid records to use in a program modification.

Project 3

INSTRUCTIONS: Modify and test another student's program according to the instructions provided by your teacher.

COMPETENCY TEST

PART I: TYPES OF MAINTENANCE PROGRAMMING

Project 1

INSTRUCTIONS: Identify and explain the four types of program modification. Then, match the user requests for change provided by your teacher to the modification types.

1.

2.

3.

4.

Project 2

INSTRUCTIONS: Correctly list, in sequence, the steps in program modification.

PART II: MODIFICATION OF AN EXISITING PROGRAM

Project 1

INSTRUCTIONS: Write a paragraph identifying at least two hazards involved in program modification.

Project 2

INSTRUCTIONS: Correctly document changes to one of the programs provided by your teacher.

Project 3

INSTRUCTIONS: From the original and modified programs provided by your teacher, locate the changes in output for the modified program.

PART III: COMPANY GUIDELINES AND PROGRAM MODIFICATIONS

INSTRUCTIONS: Describe and list the four areas to consider concerning company guidelines when making program modifications.

1.

2.

3.

4.

PART IV: MODIFICATION AND TOP-DOWN TESTING CONCEPTS

INSTRUCTIONS: List, in the correct sequence, the steps to follow in testing a program modification.

PART V: TESTING PROGRAM MODIFICATIONS

INSTRUCTIONS: **Successfully code, test, debug, and document program modifications as evidenced by the following criteria:**

A. Correctly retrieve and edit a program previously coded and debugged, and modify it according to your teacher's instructions. Some modifications may include:

1. Adding more variables
2. Changing column headings
3. Adding total lines
4. Testing with valid and invalid records
5. Validating fields

B. Obtain a "clean compile" of source codes that have been edited and modified.

C. Successfully test the program, matching the output with the expectations of the test plan.

D. Document changes by embedding comments in code.

COMPETENCY CHECKLIST

ESSENTIAL ELEMENT: 75.87(h)(4)(C)

The student will be provided opportunities to: develop an understanding of the programmer's responsibilities in program maintenance.

OBJECTIVE:	Students will be able to summarize the components of program maintenance, and use these components to modify a program	MASTERY	NON MASTERY
1.	Identify and explain the four types of maintenance programming.	____	____
2.	Determine changes to be made to an existing program that the user has requested to be modified.	____	____
3.	Follow company guidelines when creating documentation for program modification.	____	____
4.	Use top-down testing concepts when modifying an existing program.	____	____
5.	Create valid and invlaid data records and test program modifications.	____	____
		____	____
		____	____
		____	____

STUDENT NAME ______________________________

SECTION III

STRUCTURED PROGRAMMING

ESSENTIAL ELEMENT

75.87(h)(2)

Concepts and skills related to structured programming applications.

The student will be provided opportunities to:

A. develop an understanding of structured programming;

B. identify the concepts of random and sequential files;

C. translate solutions into major structural elements of a program;

D. translate solutions into language statements for input, processing, and output; and

E. develop the ability to use an advanced operating system computer.

SUGGESTED UNIT LESSON PLAN

SECTION III: STRUCTURED PROGRAMMING

UNIT I: PROGRAM SPECIFICATION AND DEVELOPMENT CYCLE

ESSENTIAL 75.87
ELEMENT: (h)(2)(A)(B)

ALLOCATED
TIME: 15 Hours

UNIT OBJECTIVE: Students will discuss program specifications and business program applications.

STUDENT OBJECTIVES: After completing this unit, the student will be able to:

1. Discuss the program development cycle
2. Review file design, record layouts, report layouts, and screen layouts
3. Identify the components of a program specification

FOCUS: Programmers must be able to interpret program specifications in order to design, code, and test programs accurately.

DOMAINS: Activities and competency tests have been designed to provide learning experiences utilizing the affective, cognitive, and/or psychomotor domains.

BASIC SKILLS: Activities and competency tests have been designed to reinforce the basic skills of reading, writing, and/or mathematics.

CONTENT OUTLINE

- I. Review program/system development concepts
  - A. Program life cycle
  - B. File design
  - C. Record layouts
  - D. Report layouts
  - E. Screen layouts
- II. Program specifications
  - A. Program specification components
  - B. Types of program applications

SUGGESTED TEACHER ACTIVITIES

General Teacher Preparations

1. Preview the unit and review objectives.
2. Decide on a variety of instructional methods to present the unit.
3. Prepare questioning techniques and closure statements.
4. Make modifications in curriculum for special needs students.
5. Consult several alternative sources to enhance and update your knowledge of the current trends, issues, and processes related to the unit content.
6. Select exercises, drills, and other resources to use as supplemental materials for the unit.
7. Secure and prepare sufficient quantities of software backup diskettes for student use.
8. When appropriate, take a field trip or have a guest speaker present a portion of the unit describing industry standards.
9. Prepare appropriate bulletin boards and transparencies.
10. Make copies of appropriate handouts, activities, and test materials.
11. Secure overhead projector, LCD computer panel for data projection, and an appropriate screen.

General Classroom Preparations

1. Secure the students' attention.
2. Communicate learning expectations--goals to be accomplished.
3. Emphasize the value/importance of the unit content or activity.
4. Relate unit content to prior or future learning.
    a. Use discussions and pretests to determine prior knowledge of the unit content.
    b. From the results of the discussions and pretests, modify your teaching plans to fit student needs.
    c. Use enthusiasm, and relate the content to the student's interests.

Reteach Activities

1. Use a new method to reteach a unit activity.
2. Using additional resources, create individualized materials for the more and less capable students.
3. Utilize those sections of tests which need additional reinforcement.
4. Utilize unit activities not previously used.
5. Use peer practice for the reteaching of terminology--one student asks about the meaning of a word. The other student has the list of answers (words). Hints will be given until the word is matched with its correct definition.

Specific Teaching Activities

1. Design a bulletin board on flowcharting.

2. Arrange for a guest speaker--a system analyst or lead programmer from a local business--to speak on program specification or program design.

3. Collect the following examples for class discussion and evaluation:

   a. Various types of printer paper
   b. Various types of printer forms
   c. A printer spacing chart
   d. Screen layout forms/report spacing record/screen layout
   e. Various input/output forms
   f. Program narratives
   g. Examples of batch and online applications.

Activities Four and Five

Projects 1 and 2	Collect samples of well-constructed and poorly-constructed program specifications to be used in discussion.
Project 3	Both of these activities require that research and additional reading be completed. If you do not receive periodicals for your classroom, you may wish to make arrangements with your school library to have materials available for the students.

ANSWERS TO ACTIVITIES

Activity One

Accurate description of the following:

1. User requests computer solution to problem
2. User/analyst develops complete specifications
3. Programmer designs and codes program
4. Programmer tests and debugs program
5. Programmer prepares program and user documentation
6. Programmer begins implementation process
7. Programmer initiates program maintenance (modification)
8. User evaluation leads to major revision/new program

Activity Two

Project 1

Definitions and comparison to be evaluated to the satisfaction of the instructor.

1. Sequential files
2. Random files

Project 2

Discussion of the following features to be evaluated to the satisfaction of the instructor.

1. Logical records
2. Variables (fields) alpha and numeric
3. Groups and elements
4. Fixed and variable length records

Project 3

Description of the following report layout types to be evaluated to the satisfaction of the instructor.

1. Types of forms
2. Print chart
3. Types of report lines
4. Good report facts vs. hard-to-understand report layouts

Project 4

1. Screen layout form
2. Types of information displayed
3. Factors to consider
4. Menu design
5. Factors in good screen design vs. hard-to-understand displays
6. Computer-to-user dialogue

Activity Three

Project 1

1. Purpose of program
2. Input, output layouts
3. Processing narrative (algorithms)
4. File descriptions

Activity Four Evaluated to the satisfaction of the instructor.

Activity Five

Projects 1-3 Evaluated to the satisfaction of the instructor.

Activity Six

```
      C       F    I
      O       I    N
      M       L    T
      P     PATH   E
BATCHFILE     E    R
L  U  L    C  R    B
O  R DENSITY     D L
C  R  R    L  M  O O
K  E       I  O  W C
I  N       N  D  H K
N  T       DEBUGGING
G  D F  R  E  L  L A
  FIELD E  R  E  E P
   R O  C
BYTE W  O  J   F
   C C  R  C   I
   T HEADERLABEL
   O A         E
   R RANDOMFILE
   Y T
```

Activity Seven

```
 I  P SYNTAC-ERROR
 N  R         O
 T ROM        O    P
 E  G SUBDIRECTORIES
 R  R         D    E
 N  A      D FIELD U
PARAMETERS I  R    D
 L  S      R  E  V O
JCL P  D   E  C  O C
 O SEQUENCECONTROL O
 M  C  N   T  O  U D
 M  I  S   O  R  M E
 A  F  I   R  Y  E
 N  I  T  BYTE   L F
 D  C  Y         A I
 S PATH TRAILERLABEL
    T            E E
 LOGICERROR   MODULE
    O          O
  RANDOMFILE   S
```

COMPETENCY TEST ANSWERS

Part 1

Discussion of the following to be evaluated to the satisfaction of the instructor.

1. User requests computer solution to problem
2. User/analyst develops complete specifications
3. Programmer designs and codes program
4. Programmer tests and debugs program
5. Programmer prepares program and user documentation
6. Programmer begins implementation process
7. Programmer initiates program maintenance (modification)
8. User evaluation leads to major revision/new program

Part 2

Projects 1-4

Answers will vary depending upon the textbook used, and on the teacher's lecture. Evaluate according to thethe criteria that you are emphasizing.

Part 3

Project 1

Description of two of the following to be evaluated to the satisfaction of the instructor.

1. Purpose of program
2. Input, output layouts
3. Processing narrative (algorithms)
4. File descriptions

Project 2

Description to be evaluated to the satisfaction of the instructor.

Project 3

Description of differences between batch and online applications to be evaluated to the satisfaction of the instructor.

SUGGESTED UNIT LESSON PLAN

SECTION III: STRUCTURED PROGRAMMING

UNIT II: PROGRAM DESIGN

ESSENTIAL ELEMENT: 75.87 (h)(2)(A)

ALLOCATED TIME: 10 Hours

UNIT OBJECTIVE: Students will develop an understanding of structured programming design.

STUDENT OBJECTIVES: After completing this unit, the student will be able to:

1. Define the components of structured programming
2. Describe program design tools
3. Use HIPO charts and structure charts to define program functions
4. Illustrate the four control structures
5. Develop and document logic flow
6. Employ structured walkthroughs to test program logic flow

FOCUS: When a student understands programming structures and can apply various program design techniques, he/she will be able to construct programs which are easier to debug and maintain than non-structured programs are.

DOMAINS: Activities and competency tests have been designed to provide learning experiences utilizing the affective, cognitive, and/or psychomotor domains.

BASIC SKILLS: Activities and competency tests have been designed to reinforce the basic skills of reading, writing, and/or mathematics.

CONTENT OUTLINE

I. Program design tools
  A. Widely-used design techniques
  B. Other design techniques
II. Program design components
  A. Program specifications
  B. Output-driven design
  C. Top-down design
  D. Detailed processing logic
III. Structured walkthroughs
  A. Peer-group review technique
  B. Participants
  C. Conducting a walkthrough
  D. Egoless programming

SUGGESTED TEACHER ACTIVITIES

General Teacher Preparations

1. Preview the unit and review objectives.
2. Decide on a variety of instructional methods to present the unit.
3. Prepare questioning techniques and closure statements.
4. Make modifications in curriculum for special needs students.
5. Consult several alternative sources to enhance and update your knowledge of the current trends, issues, and processes related to the unit content.
6. Select exercises, drills, and other resources to use as supplemental materials for the unit.
7. Secure and prepare sufficient quantities of software backup diskettes for student use.
8. When appropriate, take a field trip or have a guest speaker present a portion of the unit describing industry standards.
9. Prepare appropriate bulletin boards and transparencies.
10. Make copies of appropriate handouts, activities, and test materials.
11. Secure overhead projector, LCD computer panel for data projection, and an appropriate screen.

General Classroom Preparations

1. Secure the students' attention.
2. Communicate learning expectations--goals to be accomplished.
3. Emphasize the value/importance of the unit content or activity.
4. Relate unit content to prior or future learning.
    a. Use discussions and pretests to determine prior knowledge of the unit content.
    b. From the results of the discussions and pretests, modify your teaching plans to fit student needs.
    c. Use enthusiasm, and relate the content to the student's interests.

Reteach Activities

1. Use a new method to reteach a unit activity.
2. Using additional resources, create individualized materials for the more and less capable students.
3. Utilize those sections of tests which need additional reinforcement.
4. Utilize unit activities not previously used.
5. Use peer practice for the reteaching of terminology--one student asks about the meaning of a word. The other student has the list of answers (words). Hints will be given until the word is matched with its correct definition.

Specific Teaching Activities:

1. Design a bulletin board on control structures.
2. Arrange a field trip to observe a mainframe computer in operation.

Activity Three

Project 1	Make HIPO charts available for student use.
Project 2	Prepare a program that can be set up in modules.
Project 3	Make structure charts available for student use.
Project 4	Create information so students can construct structure charts.

Activity Four

Projects 1-4	Develop information on appropriate situations for control structures.
Project 5	Make periodicals available in the classroom, or arrange to use the school library.

Activity Five

Project 1	Develop problem definitions and graphic illustrations.
Project 2	Prepare problem definitions.
Project 3	Have periodicals available in the classroom, or arrange to use the school library.
Project 4	Develop examples of logic flow.
Project 5	Prepare problem definitions

Activity Six Prepare design documentation.

Competency Test

Part 2 Prepare business-oriented application descriptions with modules.

Part 3 Develop problems to construct structure charts.

Part 5

Project 1	Prepare problem demonstrating logic flow.
Project 2	Prepare graphic illustration of logic structures.
Project 3	Prepare problem definitions.

Part 6 Prepare documentation for a structured walkthough to test logic flow.

ANSWERS TO ACTIVITIES

Activity One

Discussion is to be evaluated to the satisfaction of the instructor, but should include the following:

Structured programming is a method of programming using the basic control structures, top-down design, and modules.

Activity Two:

1. HIPO charts
2. Structure charts
3. Program flowcharts
4. Pseudocode

1. Nassi-Schneidermann diagrams
2. Chapin charts
3. Warnier-Orr diagrams
4. Jackson diagrams

Activity Three

Projects 1-4

Answers will vary depending upon the charts and textbook used, and on the teacher's lecture. Evaluate according to the criteria that you are emphasizing.

Activity Four

Projects 1-5 Evaluated to the satisfaction of the instructor.

Activity Five

Projects 1-5 Evaluated to the satisfaction of the instructor.

Activity Six Evaluated to the satisfaction of the instructor.

Activity Seven Answers will vary depending upon the textbook used, and on the teacher's lecture.
Evaluated to the satisfaction of the instructor.

COMPETENCY TEST ANSWERS

Part 1

Discussion to be evaluated to the satisfaction of the instructor.

Parts 2 and 3

Evaluated to the satisfaction of the instructor.

Part 4

Accurate description of the following:
1. Sequence (sequential)
2. Selection IF/THEN/ELSE
3. Iteration (DO WHILE/DO UNTIL)
4. Case construct

Part 5

Projects 1-3 Evaluated to the satisfaction of the instructor.

Part 6

Evaluated to the satisfaction of the instructor.

SUGGESTED UNIT LESSON PLAN

SECTION III: STRUCTURED PROGRAMMING

UNIT III: CODING

ESSENTIAL ELEMENT: 75.87 (h)(2)(D)

ALLOCATED TIME: 25 Hours

UNIT OBJECTIVE: Students will demonstrate the structural elements of a programming language, will translate a problem solution into language statements, and will successfully test and debug the program.

STUDENT OBJECTIVES: After completing this unit, the student will be able to:

1. Demonstrate the ability to write code for business problems using established coding standards.
2. Demonstrate debugging a source program with syntax errors.
3. Demonstrate debugging a source program with logic errors.
4. Demonstrate the ability to obtain valid reports using appropriate test data.

FOCUS: When the student can translate a graphic representation of a problem to a specific programming code, he/she will have accurate program solutions.

DOMAIN: Activities and competency tests have been designed to provide learning experiences utilizing the affective, cognitive, and/or psychomotor domains.

BASIC SKILLS: Activities and competency tests have been designed to reinforce the basic skills of reading, writing, and/or mathematics.

CONTENT OUTLINE

- I. Language structure, rules, and syntax
  - A. Overall program components
  - B. Rules--spacing, punctuation, line numbers, etc.
  - C. Interpreting syntax
  - D. Incorporating established standards
- II. Structured programming techniques
  - A. Group functions into modules
  - B. Call modules from mainline
- III. Format notation
  - A. Symbols
  - B. Interpretation
- IV. Entering program code/text editor
- V. Commands used in translating source code into machine language
- VI. Syntax errors
  - A. Diagnostic messages
  - B. Correcting errors
- VII. Program testing and debugging
  - A. Test data
  - B. Logic errors
  - C. Abend errors

SUGGESTED TEACHER ACTIVITIES

General Teacher Preparations

1. Preview the unit and review objectives.
2. Decide on a variety of instructional methods to present the unit.
3. Prepare questioning techniques and closure statements.
4. Make modifications in curriculum for special needs students.
5. Consult several alternative sources to enhance and update your knowledge of the current trends, issues, and processes related to the unit content.
6. Select exercises, drills, and other resources to use as supplemental materials for the unit.
7. Secure and prepare sufficient quantities of software backup diskettes for student use.
8. When appropriate, take a field trip or have a guest speaker present a portion of the unit describing industry standards.
9. Prepare appropriate bulletin boards and transparencies.
10. Make copies of appropriate handouts, activities, and test materials.
11. Secure overhead projector, LCD computer panel for data projection, and an appropriate screen.

General Classroom Preparations

1. Secure the students' attention.
2. Communicate learning expectations--goal(s) to be accomplished.
3. Emphasize the value/importance of the unit content or activity.
4. Relate unit content to prior or future learning.
    a. Use discussions and pretests to determine prior knowledge of the unit content.
    b. From the results of the discussions and pretests, modify your teaching plans to fit student needs.
    c. Use enthusiasm, and relate the content to the student's interests.

Reteach Activities

1. Use a new method to reteach a unit activity.
2. Using additional resources, create individualized materials for the more and less capable students.
3. Utilize those sections of tests which need additional reinforcement.
4. Utilize unit activities not previously used.
5. Use peer practice for the reteaching of terminology--one student asks about the meaning of a word. The other student has the list of answers (words). Hints will be given until the word is matched with its correct definition.

Specific Teaching Activities

1. Design a bulletin board on programming.
2. Secure coding forms.
3. Run a program so that you will have an example of the source listing and the compile. You may wish to copy this for use as a handout.
4. Review the DOS/JCL commands.

Activity One		
	Project 1	Prepare a program with coding standards applied.
	Project 2	Code program on coding forms.
	Project 3	Prepare a program to which the students will apply suggested coding standards.
Activity Two		
	Project 1	Prepare syntactically correct and incorrect statements.
	Project 2	Prepare a program to which students will add syntax errors, compile the program, and get source listings.
Activity Four		
	Project 1	Make periodicals available, or make arrangements to use the school library.
	Project 2	Prepare programming problems for student use.
Activity Five		Prepare a source program and five (5) data records in order for students to play computer and diagram output.
Activity Six		
	Project 1	Prepare programs with compilation errors.
	Project 2	Prepare a program on hard copy for students to use in learning the commands of the text editor.
	Project 3	Provide a program design that students can convert to code to create a source program.

Competency Test

Part 1		
	Project 2	Secure business problems for student use.
	Project 3	Provide English phrases which will be converted to syntactically correct code.
	Project 4	Prepare a program with at least five (5) standards for students to identify.
	Project 5	Prepare a program with no coding standards.
Part 2		
	Project 2	Prepare a program listing with syntax errors.
Part 3		Prepare a program listing with a logic error.
Part 4		Prepare programming problems.

ANSWERS TO ACTIVITIES

Activity One

Projects 1-3 Evaluated to the satisfaction of the instructor.

Activity Two

Projects 1-3 Evaluated to the satisfaction of the instructor.

Activity Three

Projects 1-2 Evaluated to the satisfaction of the instructor.

Activity Four

Projects 1-2 Evaluated to the satisfaction of the instructor.

Activity Five Evaluated to the satisfaction of the instructor.

Activity Six

Project 1-3 Evaluated to the satisfaction of the instructor.

COMPETENCY TEST ANSWERS

Parts 1-4

Answers will vary depending upon the coding language and the textbook used, and on the teacher's lecture. Evaluate according to the criteria that you are emphasizing.

SUGGESTED UNIT LESSON PLAN

SECTION III: STRUCTURED PROGRAMMING

UNIT IV: OPERATING SYSTEMS ENVIRONMENT

ESSENTIAL ELEMENT: 75.87 (h)(2)(E)

ALLOCATED TIME: 15 Hours

UNIT OBJECTIVE: Students will demonstrate the ability to use advanced operating system concepts on the computer available to them.

STUDENT OBJECTIVES: After completing this unit, the student will be able to:

1. Explain the purpose of MS-DOS and other operating systems
2. Identify the types of MS-DOS and other operating system commands
3. Explain the use of wildcards in a file specification
4. Explain the purpose of JCL

FOCUS: The student must understand the functional characteristics of computer operating systems before he/she can efficiently utilize the computer.

DOMAINS: Activities and competency tests have been designed to provide learning experiences utilizing the affective, cognitive, and/or psychomotor domains.

BASIC SKILLS: Activities and competency tests have been designed to reinforce the basic skills of reading, writing, and/or mathematics.

CONTENT OUTLINE

- I. Operating systems
  - A. Definitions
  - B. Concepts
- II. Review of simple DOS commands
  - A. DIR
  - B. COPY
  - C. DEL
  - D. RENAME
  - E. TYPE
  - F. FORMAT
- III. More DOS commands
  - A. CHKDSK
  - B. COMPDUPE
  - C. DISKCOPY
  - D. Directories
  - E. Batch files
- IV. JCL
  - A. Purpose of JCL
  - B. Creating JCL
  - C. JCL errors

SUGGESTED TEACHER ACTIVITIES

General Teacher Preparations

1. Preview the unit and review objectives.
2. Decide on a variety of instructional methods to present the unit.
3. Prepare questioning techniques and closure statements.
4. Make modifications in curriculum for special needs students.
5. Consult several alternative sources to enhance and update your knowledge of the current trends, issues, and processes related to the unit content.
6. Select exercises, drills, and other resources to use as supplemental materials for the unit.
7. Secure and prepare sufficient quantities of software backup diskettes for student use.
8. When appropriate, take a field trip or have a guest speaker present a portion of the unit describing industry standards.
9. Prepare appropriate bulletin boards and transparencies.
10. Make copies of appropriate handouts, activities, and test materials.
11. Secure overhead projector, LCD computer panel for data projection, and an appropriate screen.

General Classroom Preparations

1. Secure the students' attention.
2. Communicate learning expectations--goal(s) to be accomplished.
3. Emphasize the value/importance of the unit content or activity.
4. Relate unit content to prior or future learning.
    a. Use discussions and pretests to determine prior knowledge of the unit content.
    b. From the results of the discussions and pretests, modify your teaching plans to fit student needs.
    c. Use enthusiasm, and relate the content to the student's interests.

Reteach Activities

1. Use a new method to reteach a unit activity.
2. Using additional resources, create individualized materials for the more and less capable students.
3. Utilize those sections of tests which need additional reinforcement.
4. Utilize unit activities not previously used.
5. Use peer practice for the reteaching of terminology--one student asks about the meaning of a word. The other student has the list of answers (words). Hints will be given until the word is matched with its correct definition.

Specific Teaching Activities

1. If you have a MS-DOS system, it would be wise to stress information about this system more than JCL. It is important, however, for the students to understand the concepts of JCL systems.
2. Conversely, if you have a JCL mainframe system it would be wise to stress this system more than the MS-DOS. It is important, however, for the students to understand the concepts of MS-DOS systems.
3. Design a bulletin board on MS-DOS/JCL.
4. Secure a list of MS-DOS commands and functions.
5. Secure a copy of JCL commands used on a mainframe.
6. Arrange for a computer operator from a local business to speak to the class concerning system operators.

Activity Four

Project 1	Secure the proper JCL materials for the program.
Project 2	Make school periodicals available to students, or make arrangements to use the school library.

ANSWERS TO ACTIVITIES

Activity One

Project 1 The operating system is a set of programs that allows the computer system to manage its own operations.

Project 2 Answers will vary depending upon the equipment available on the current market, on the textbook used, and on the teacher's lecture. Evaluate description according to the criteria that you are emphasizing.

Activity Two

```
 1. A> DIR B:                          11. A> FORMAT B:

 2. A> DIR B: *.BAS                    12. A> FORMAT B:/S

 3. A> DIR /P                          13. A> FORMAT B:/V

 4. A> DIR B:/W                        14. A> CHKDSK B:

 5. A> COPY FORMAT.COM B.              15. A> MD B:WORKAREA
                                           B> MD WORKAREA

 6. A> COPY *.BAT B:                   16. B> CD WORD
                                           A> CD B:WORD

 7. A> DEL B:*.BAK                     17. B> CD WORKB
                                           B> RD WORKB
                                           B> DEL *.*y
                                           B> CD \

 8. A> DEL B:PROG1.BAS                 18. PATH B:\

 9. A> RENAME B:CHAP1PRG.CBL B:C1PR3.CBL

                                       19. COMPDUPE

10. A> TYPE AUTOEXEC.BAT               20. A> COPY *.*
                                           A>DISKCOPY A: B:
```

Activity Three Evaluated to the satisfaction of the instructor.

Activity Four

Project 1 Answers will vary according to JCL provided. Evaluate the annotations to the satisfaction of the instructor.

Project 2 Evaluated to the satisfaction of the instructor.

COMPETENCY TEST ANSWERS

Part 1

The operating system is a set of programs that allows the computer system to manage its own operations.

Part 2

Evaluated to the satisfaction of the instructor.

Part 3

Evaluated to the satisfaction of the instructor.

Part 4

Evaluated to the satisfaction of the instructor.

TERMINOLOGY

Batch File	A sequence of DOS command.
Blocking	Term used with magnetic tape when two or more logical records are grouped together as one physical record.
Byte	A letter, number, punctuation mark or space.
Case Structure	A selection that contains more than two possible outcomes. The case selection may be determined by a variable that is input into the program. Depending on the value of the variable, or different instructions or set of instructions could be executed.
Compiler	A program that translates the source program statements into machine language instruction and produces an object program.
Current Directory	The directory that you are in.
Cylinder	All tracks of data that can be read from a magnetic disk in any given position of the access arm.
Debugging	The process of detecting, locating, and correcting errors in a computer program.
Density	Term used to express the amount of data that can be stored on one inch of magnetic tape.
Detail Program Flowchart	Outlines each step, calculation, test, and comparison involved in the solution of the problem.
Directory	Area on a diskette which keeps track of the files on that diskette--a table of contents.
DOS (Disk Operating System)	A program that sends out all the instructions to the computer.
DO WHILE	A looping control structure where one or more steps/instructions are repeated as long as a given condition remains true. This structure tests the terminating condition first. If true the action is never performed.
DO UNTIL	A looping control instruction that executes the action first and then tests for the terminating condition. The action is always performed at least once or until the stated terminating condition is TRUE.
External Commands	Commands DOS must read from disk before they can be executed because they are too large to keep in memory all the time. Examples -- FORMAT, CHKDSK, DISKCOPY, etc.

Field	An element, a single data item.
File	A group of related records.
Filter	A command that accepts input data, transforms it in some way before output. Examples--FIND, MORE, and SORT.
Flowchart	A pictorial representation of what you want the computer to do step-by-step and in what order to do it.
Header Label	Label on magnetic tape which follows the load point and contains the name of the file and the date it was created.
IF-THEN-ELSE	A control structure where a decision is a structure made as to which instructions should be executed next. Also referred to as the selection structure.
Interblock Gap	The term given to the gap on magnetic tape that separates records by .6 of an inch.
Internal Commands	Commands loaded into the computer's memory that remain there until the power is turned off or the reset button is pressed. Examples -- COPY, DELETE, RENAME, and DIR.
JCL (Job Control Language)	A language that serves as a link between the operating system and the application program.
Logic Error	An error which occurs because the logic of the program is not processing the data in the correct manner.
Module	Usually one input, output, or processing step within the overall program which can be executed independently.
Modular Program	Each block in the flowchart represents a flowchart major step in the program logic.
Parameters	Items which can be included on MS-DOS command to specify additional information to the system.
Path	Shows the location of a file in a directory.
Program	This is the first stage of the program specification development cycle.
Program Design	This is the second stage of the program development cycle.
Pseudocode	A precise English-like statement telling your step-by-step solution.
Random File	Records may be written and read in any order desired without reading any previous records.

READ/WRITE Heads	The device of a disk drive or tape drive that reads or writes information to the magnetic storage medium.
Record	A group of related data fields.
ROM (Read Only Memory)	Memory which can only be read, not written to.
Root Directory	The first directory level of a diskette, created when the diskette is formatted.
Sequence Control Structure	A control structure shows the way one step occurs immediately after another.
Sequential File	Data records are stored one right after the other in ascending or descending order by a certain key field on the record.
Structured Programming	A method for organizing source code in structures or modules.
Subdirectories	Directories contained within the root directory.
Syntax-error	A grammatical, misspelling, or punctuation error that is detected by the compiler or interpreter.
System Flowchart	Is designed to present an overview of the data flow through all parts of the data processing system.
Tracks	Concentric circles that can be accessed in any given setting of a single read/write head on magnetic disk.
Trailer Label	Label at the end of the file on magnetic tape which contains the number of records in the file.
Volume Label	Label to identify the diskette.
Wildcards	Either an asterisk or question mark that can be used in place of characters in a file name in MS-DOS.

SECTION III: STRUCTURED PROGRAMMING

UNIT I: PROGRAM SPECIFICATION AND DEVELOPMENT CYCLE

UNIT OBJECTIVE:

Students will discuss program specifications and business program applications.

STUDENT OBJECTIVES:

After completing this unit, the student will be able to:

1. Discuss the program development cycle.
2. Review file design, record layouts, report layouts, and screen layouts.
3. Identify the components of a program specification.

GENERALIZATION:

Programmers must be able to interpret program specifications in order to design, code, and test programs accurately.

UNIT OVERVIEW

I. Review program/system development concepts

  A. Program life cycle

    1. User requests computer solution to problem
    2. User/analyst develops complete specifications
    3. Programmer designs and codes program
    4. Programmer tests and debugs program
    5. Programmer prepares program and user documentation
    6. Programmer begins implementation process
    7. Programmer initiates program maintenance (modification)
    8. User evaluation leads to major revision/new program

  B. File design

    1. Sequential files
    2. Random files

  C. Record layouts

    1. Logical records
    2. Variables (fields) alpha and numeric
    3. Groups and elements
    4. Fixed and variable length records

  D. Report layouts

    1. Types of forms
    2. Print chart
    3. Types of report lines
    4. Good report facts vs. hard-to-understand report layouts

- E. Screen layouts
    - 1. Screen layout form
    - 2. Types of information displayed
    - 3. Factors to consider
    - 4. Menu design
    - 5. Factors in good screen design vs. hard-to-understand displays
    - 6. Computer-to-user dialogue

II. Program Specifications

- A. Program specification components
    - 1. Purpose of program
    - 2. Input, output layouts
    - 3. Processing narrative (algorithms)
    - 4. File descriptions
- B. Types of program applications
    - 1. Batch applications
        - a. Listing a data file
        - b. Simple calculations
        - c. Reports with totals and counters
        - d. Comparing variables--alternate processing
        - e. Selecting certain records to process
        - f. Control breaks, summary reports
        - g. Internal table load and search
        - h. Processing multiple record types in same file
    - 2. Online applications
        - a. Inquiries, screen displays
        - b. Data entry and validation

PROGRAM LIFE CYCLE

INSTRUCTIONS: Describe the components of the program life cycle.

FILE DESIGN AND LAYOUTS

Project 1

INSTRUCTIONS: Define and compare various file designs.

Project 2

INSTRUCTIONS: Discuss the features of record layouts.

Project 3

INSTRUCTIONS: Describe the different types of report layouts.

Project 4

INSTRUCTIONS: List the factors to consider in screen layouts.

PROGRAM SPECIFICATIONS

INSTRUCTIONS: List the components of a program specification.

RESEARCH

INSTRUCTIONS: **Using at least three resources, research one of the topics listed below. Develop a paper using the following structure: introductory paragraph, several developmental paragraphs, and a conclusion. Use internal documentation, and attach a photocopy of the source materials you use. Be sure to write this research paper in your own words.**

1. Magnetic disk--

    What is it?
    How is data stored on it?
    Discuss the disk drive
    How is data accessed?
    Advantages/disadvantages of this storage medium

2. Magnetic tape

3. Mass storage

4. New storage technology--

    Bubble memory

    Videodisc

5. File organization--

    Random/direct file organization

    Indexed file organization

6. Storage for microcomputers--

    Floppy disks

    Hard disks

EXAMINATION OF PROGRAM SPECIFICATIONS

Project 1

INSTRUCTIONS: Examine a copy of a well-constructed and complete program specification, provided by your teacher, for each type of program application.

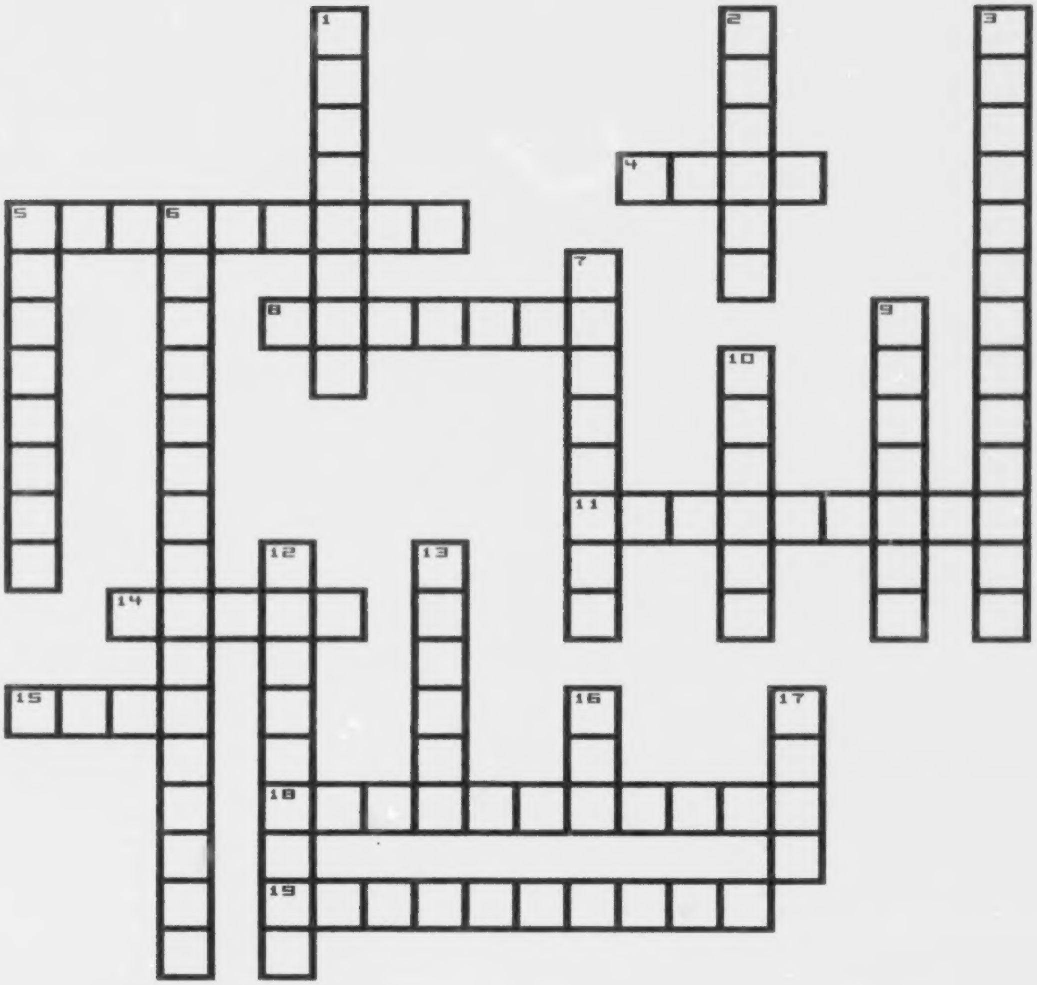
Project 2

INSTRUCTIONS: Examine a copy of a poorly-constructed, incomplete program specification provided by your teacher. List any questions raised by the missing information.

Project 3

INSTRUCTIONS: Read literature about the standard types of batch and online applications. Select two articles, and prepare an abstract of them both.

TERMINOLOGY CROSSWORD PUZZLE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TERMINOLOGY CROSSWORD PUZZLE CLUES

ACROSS CLUES

4. Shows the location of the file in a directory.

5. A sequence of DOS commands.

8. Term used to express the amount of data that can be stored on one inch of magnetic tape.

11. The process of detecting, locating, and correcting errors in a computer program.

14. An element, a single data item.

15. A letter, number, punctuation mark or space.

18. Label on magnetic tape which follows the load point and contains the name of the file.

19. Records may be written and read in any order desired without reading any previous records.

DOWN CLUES

1. A program that translates the source program statements into machine language instruction.

2. A command that accepts input data, transforms it in some way before output.

3. The term given to the gap on magnetic tape that separates records by .6 of an inch.

5. Term used with magnetic tape when grouped together as one record.

6. The directory which you are in.

7. Tracks of data that can be read from a magnetic disk in any given position of the access arm.

9. A control structure where steps are repeated as long as a given condition remains true.

10. One input, output, or processing step within the program which can be executed independently.

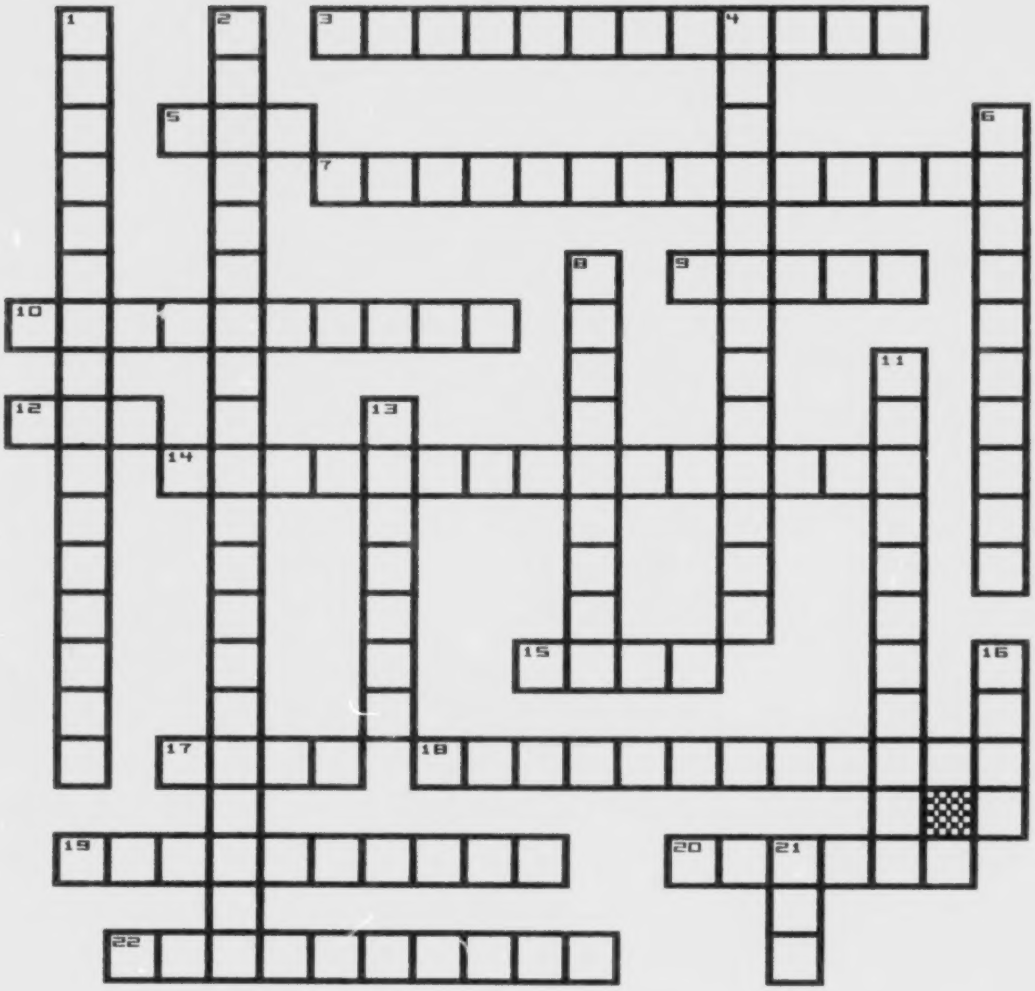
12. A pictorial representation of what you want the computer to do step-by-step and in order.

13. A group of related data fields.

16. A language that serves as a link between the operating system and the application program.

17. A group of related records

TERMINOLOGY CROSSWORD PUZZLE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TERMINOLOGY CROSSWORD PUZZLE CLUES

ACROSS CLUES

3. A grammatical, spelling, or punctuation error that is detected by the compiler.

5. Read Only Memory which can only be read, not written to.

7. Directories contained within the root directory.

9. An element, a single data item.

10. Items which can be included on MS DOS command to specify additional information to the system.

12. A language that serves as a link between the operating system and the application program.

14. A control structure shows the way one step occurs immediately one after another.

15. A letter, number, punctuation mark or space.

17. Shows the location of a file in a directory.

18. Label at the end of the file on magnetic tape which contains the number of records in the file.

19. An error in which the logic of the program is not processing the data in the correct manner.

20. One input, output, or processing step within the program which can be executed independently.

22. Records may be written and read in any order desired without reading any previous records.

DOWN CLUES

1. Commands loaded into the computer's memory that remain until the power is eliminated.

2. The first stage of the program development cycle.

4. The first directory level of a diskette, created when the diskette is formatted.

6. A precise English-like statement telling your step-by-step solution.

8. Area on a diskette which keeps track of the files on that diskette--a table of contents.

11. Label to identify the diskette.

13. Term used to express the amount of data that can be stored on one inch of magnetic tape.

16. A group of related records.

21. A program that sends out all the instructions to the computer.

COMPETENCY TEST

PART I: PROGRAM LIFE CYCLE

INSTRUCTIONS: Identify and discuss the components of the program life cycle.

PART II: FILE DESIGN AND LAYOUTS

Project 1

INSTRUCTIONS: Describe and differentiate between sequential and random files.

Sequential:

Random:

Project 2

INSTRUCTIONS: Describe various types of record layouts, and differentiate between fixed and variable length records.

Project 3

INSTRUCTIONS: List and describe the types of report layout forms and report lines.

Project 4

INSTRUCTIONS: List and describe the types of information displayed on screen layouts and the factors to consider in screen design.

PART III: PROGRAM SPECIFICATIONS

Project 1

INSTRUCTIONS: Describe two components of a program specification.

Project 2

INSTRUCTIONS: Describe three types of program applications.

1.

2.

3.

Project 3

INSTRUCTIONS: Describe the differences between online and batch applications.

COMPETENCY CHECKLIST

ESSENTIAL ELEMENT

75.87(h)(2)(A)

The student will be provided opportunities to: develop an understanding of structured programming.

OBJECTIVE: Students will discuss program specifications and program applications.	MASTERY	NON MASTERY
1. Discuss the program development cycle.	____	____
2. Review file design, record layouts, report layouts, and screen layouts.	____	____
3. Identify the components of a program specification.	____	____
	____	____
	____	____
	____	____
	____	____

STUDENT NAME ______________________________

SECTION III: STRUCTURED PROGRAMMING

UNIT II: PROGRAM DESIGN

UNIT OBJECTIVE:

Students will develop an understanding of structured programming design.

STUDENT OBJECTIVES:

After completing this unit, the student will be able to:

1. Define the components of structured programming.
2. Describe program design tools.
3. Use HIPO charts and structure charts to define program functions.
4. Illustrate the four control structures.
5. Develop and document logic flow.
6. Employ structured walkthroughs to test program logic flow.

GENERALIZATION:

When a student understands programming structures and can apply various program design techniques, he/she will be able to construct programs which are easier to debug and maintain than non-structured programs are.

UNIT OVERVIEW

I. Program design tools
    A. Widely-used design techniques
        1. HIPO charts
            a. VTOC
            b. Overview diagrams
            c. Detailed diagrams
        2. Structure charts
            a. Main module
            b. Subordinate modules
        3. Program flowcharts
        4. Pseudocode
    B. Other design techniques
        1. Nassi-Schneidermann diagrams
        2. Chapin charts
        3. Warnier-Orr diagrams
        4. Jackson diagrams

II. Program design components
    A. Program specifications
    B. Output-driven design
    C. Top-down design
    D. Detailed processing logic
        1. Logic structures using single entry/single exit points
            a. Sequence (sequential)
            b. Selection (IF/THEN/ELSE)

        c. Iteration (DO WHILE/DO UNTIL)
        d. Case construct

III. Structured walkthroughs
    A. Peer-group review technique
    B. Participants
    C. Conducting a walkthrough
    D. Egoless programming

STRUCTURED PROGRAMMING

INSTRUCTIONS: Discuss the concept of structured programming.

PROGRAM DESIGN TOOLS

INSTRUCTIONS: List program design tools.

HIPO CHARTS AND STRUCTURE CHARTS

Project 1

INSTRUCTIONS: Examine HIPO charts prepared for a given problem, and observe the basic steps used to construct each type of diagram. Write down the steps in the space provided below.

Project 2

INSTRUCTIONS: Working within a group, decompose a program (supplied by your teacher) into small, manageable modules using HIPO charts and diagrams.

Project 3

INSTRUCTIONS: Examine the structure charts provided by your teacher that have been prepared for business-oriented application designs. Observe the basic steps used to construct each hierarchy chart, list any steps that have been omitted from the structure charts, and make sure that they include:

a. listing a data file
b. simple calculations
c. totals, counters
d. comparing variables
e. alternate processing
f. selecting certain records to process
g. data validation/exception reporting
h. control breaks
i. summary printing
j. processing multiple record types in same file
k. internal table build and search
l. interactive applications (menu-driven programs)

Project 4

INSTRUCTIONS: From the information provided by your teacher, construct structure charts for business-oriented applications using the list provided in Project 3 above.

CONTROL STRUCTURES

GENERAL INSTRUCTIONS: From the information provided by your teacher, complete Projects 1-4 below.

Project 1

INSTRUCTIONS: Draw the SEQUENCE control structure.

Project 2

INSTRUCTIONS: Draw the IF/THEN/ELSE control structure.

Project 3

INSTRUCTIONS: Draw the DO WHILE and the DO UNTIL control structures.

Project 4

INSTRUCTIONS: Draw the CASE control structure.

Project 5

INSTRUCTIONS: Examine literature concerning the basic control structures and their uses. Select an article and prepare an abstract of it. Be ready to give an oral report to the class summarizing your findings.

LOGIC FLOW

Project 1

INSTRUCTIONS: From the problem definitions and graphic illustrations provided by your teacher, discuss which logic structures they use and why.

Project 2

INSTRUCTIONS: In a group, identify and sketch appropriate logic structures to solve problem definitions provided by your teacher.

Project 3

INSTRUCTIONS: Examine the literature concerning detailed programming-processing logic techniques. Select two articles, and prepare abstracts of them.

Project 4

INSTRUCTIONS: From the examples depicting logic flow provided by your teacher, compare and contrast each design tool presented in this unit in a class discussion.

Project 5

INSTRUCTIONS: Given several problem definitions provided by your teacher, document their logic flow using the techniques presented in this unit.

TESTING PROGRAM LOGIC FLOW

INSTRUCTIONS: Using instructor-prepared design documentation, participate in the following:

a. a structured walkthrough
b. desk checking the program
c. evaluation of the exception handling routines

PROGRAM DESIGN TECHNIQUES

INSTRUCTIONS: List at least two (2) advantages and two (2) disadvantages of each design tool presented in this unit.

COMPETENCY TEST

PART I: STRUCTURED PROGRAMMING

INSTRUCTIONS: Define structured programming and describe its components.

PART II: PROGRAM MODULES

INSTRUCTIONS: From the business-oriented applications provided by your teacher, show graphically, on a separate sheet of paper, the items below:

a. each module required by the program
b. its hierarchical level
c. its relationship to the other program modules

PART III: HIPO CHARTS AND STRUCTURE CHARTS

INSTRUCTIONS: With the problems provided by your teacher, construct structure charts for business-oriented application designs, making sure that they include:

a. listing a data file
b. simple calculations
c. totals, counters
d. comparing variables
e. alternate processing
f. selecting certain records to process
g. data validation/exception reporting
h. control breaks
i. summary printing
j. processing multiple record types in same file
k. internal table build and search
l. interactive applications (menu-driven programs)

PART IV: CONTROL STRUCTURES

INSTRUCTIONS: Identify and describe the four control structures discussed in the unit.

1.

2.

3.

4.

PART V: LOGIC FLOW

Project 1

INSTRUCTIONS: In the information provided by your teacher, correctly identify segments of logic flow techniques.

Project 2

INSTRUCTIONS: From the graphic illustration of logic structures provided by your teacher, locate logic structures, identify them by name, and describe what occurs when these control structures are used.

Project 3

INSTRUCTIONS: For the problem definition provided by your teacher, correctly apply detailed documentation techniques to correctly document the logic flow.

PART VI: STRUCTURED WALKTHROUGH

INSTRUCTIONS: Using instructor-prepared design documentation, conduct a structured walkthrough to test the logic flow of the given program.

COMPETENCY CHECKLIST

ESSENTIAL ELEMENT: 75.87(h)(2)(B)(C)

The student will be provided opportunities to: identify the concepts of random and sequential files and translate solutions into major structural elements of a program.

OBJECTIVE:	Students will develop an understanding of structured programming design.	MASTERY	NON MASTERY
1.	Define the components of structured programming.	______	______
2.	Describe program design tools.	______	______
3.	Use HIPO charts and structure charts to define program functions.	______	______
4.	Illustrate the four control structures.	______	______
5.	Develop and document logic flow.	______	______
6.	Employ structured walkthroughs to test program logic flow.	______	______
		______	______
		______	______
		______	______

STUDENT NAME ______________________________

SECTION III: STRUCTURED PROGRAMMING

UNIT III: CODING

UNIT OBJECTIVE:

Students will demonstrate the structural elements of a programming language, will translate a problem solution into language statements, and will successfully test and debug the program.

STUDENT OBJECTIVES:

After completing this unit, the student will be able to:

1. Demonstrate the ability to write code for business problems using established coding standards.
2. Demonstrate debugging a source program with syntax errors.
3. Demonstrate debugging a source program with logic errors.
4. Demonstrate the ability to obtain valid reports using appropriate test data.

GENERALIZATION:

When the student can translate a graphic representation of a problem to a specific programming code, he/she will have accurate program solutions.

UNIT OVERVIEW

I. Language structure, rules, and syntax

   A. Overall program components

      1. Variables

      2. Constants

      3. File and record descriptions

      4. Statements/sentences

      5. Paragraphs/modules

      6. Comments/remarks

   B. Rules--spacing, punctuation, line numbers, etc.

   C. Interpreting syntax

   D. Incorporating established standards

II. Structured programming techniques

   A. Group functions into modules

   B. Call modules from mainline

      1. BASIC--GOSUB; RETURN

      2. COBOL--PERFORM

III. Format notation

   A. Symbols

   B. Interpretation

IV. Entering program code/text editor

V. Commands used in translating source code into machine language

VI. Syntax errors

   A. Diagnostic messages

   B. Correcting errors

VII. Program testing and debugging

- A. Test data
  - 1. Valid
  - 2. Invalid
- B. Logic errors
- C. Abend errors

STANDARD CODE STANDARDS

Project 1

INSTRUCTIONS: Examine a program, provided by the instructor, with coding standards applied. Identify the standards.

Project 2

INSTRUCTIONS: Examine a pre-written program on a coding form and observe where the entries are placed.

Project 3

INSTRUCTIONS: Take a program provided by your teacher and apply the suggested coding standards.

DEBUGGING FOR SYNTAX ERRORS

Project 1

INSTRUCTIONS: From a list of statements provided by the teacher, and the format notation rules, determine which statements are syntactically correct. Give reasons why the others are incorrect.

Project 2

INSTRUCTIONS: Take a program selected by the teacher and put five (5) syntax errors into the program. Compile this program and get three source listings. Mark the errors on one copy and give it and another copy to the teacher for his/her files. Give the third copy to a classmate to debug. DO NOT help your classmate locate the errors.

Project 3

INSTRUCTIONS: Take the program provided to you by your classmate and locate five (5) syntax errors. Do not ask the classmate for assistance. Circle the errors on your copy of the program.

DEBUGGING FOR LOGIC ERRORS

Project 1

INSTRUCTIONS: Take a program you have completed and put a logic error in the program. Compile this program and get three source listings. Mark the error on one copy and give it and another copy to the instructor for his/her files. Give the third copy to a classmate to debug. DO NOT help your classmate locate the error.

Project 2

INSTRUCTIONS: Take the program provided to you by your classmate. Locate and correct the logic error. Do not ask your classmate for assistance. Circle the error on your copy of the program.

TEST DATA FOR VALID REPORTS

Project 1

INSTRUCTIONS: Read current articles about types of computer errors and their effects on the execution of a program.

Project 2

INSTRUCTIONS: Write, debug, and test programs using programming problems provided by your teacher. Include the following concepts:

input/output operations
arithmetic operations
logical operations
comparing
summarizing
subtotals and grouping
controlled loops
arrays
subroutine
sorting
sequential data files
random data files
data validation (editing input data)
menu-driven applications

DIAGRAM OUTPUT RECORDS

INSTRUCTIONS: Given a source program and five (5) data records supplied by your teacher, play computer and diagram the output each record would produce.

USING A TEXT EDITOR

Project 1

INSTRUCTIONS: Examine several programs with compilation errors and discuss what corrections are needed.

Project 2

INSTRUCTIONS: Using the available text editor commands to input, delete, insert, and change, enter a program provided on hard copy.

Project 3

INSTRUCTIONS: Write a source program from a design provided. Enter the program using the available text editor.

COMPETENCY TEST

PART I: CODE STANDARDS

Project 1

INSTRUCTIONS: List the rules for interpreting format notations in the language you are studying.

Project 2

INSTRUCTIONS: Using established coding standards, write code for business problems provided by your teacher.

Project 3

INSTRUCTIONS: From the list of English phrases provided by your teacher, code syntactically correct program statements and entries.

Project 4

INSTRUCTIONS: Correctly identify five (5) standards applied within the program code to a program with coding standards already applied.

Project 5

INSTRUCTIONS: Correctly apply five (5) standards of program code to a program with no coding standards applied.

PART II: DEBUGGING FOR SYNTAX ERRORS

Project 1

INSTRUCTIONS: Correctly list the types of syntax computer error messages for the language you are studying, and discuss how they affect execution.

Project 2

INSTRUCTIONS: Using a program listing with syntax errors, provided by your teacher, locate and correct the errors.

PART III: DEBUGGING FOR LOGIC ERRORS

INSTRUCTIONS: Using a program listing with a logic error, describe what the logic error is and how the source code should be changed to correct it.

PART IV: TEST DATA FOR VALID REPORTS

INSTRUCTIONS: Write, debug, and test a program using programming problems provided by your teacher. Include the following concepts:

input/output operations
arithmetic operations
logical operations
comparing
summarizing
subtotals and grouping
controlled loops
arrays
subroutine
sorting
sequential data files
random data files
data validation (editing input data)
menu-driven applications

COMPETENCY CHECKLIST

ESSENTIAL ELEMENT: 75.87(h)(2)(D)

The student will be provided opportunities to: translate solutions into language statements for input, processing, and output.

OBJECTIVE: **Students will demonstrate the structural elements of a programming language, will translate a problem solution into language statements, and will successfully test and debug the program.**	MASTERY	NON MASTERY
1. Demonstrate the ability to write code for business problems using established coding standards.	______	______
2. Demonstrate debugging a source program with syntax errors.	______	______
3. Demonstrate debugging a source program with logic errors.	______	______
4. Demonstrate the ability to obtain valid reports using appropriate test data.	______	______
	______	______
	______	______
	______	______

STUDENT NAME ______________________________

SECTION III: STRUCTURED PROGRAMMING

UNIT IV: OPERATING SYSTEMS ENVIRONMENT

UNIT OBJECTIVE:

Students will demonstrate the ability to use advanced operating system concepts on the computer available to them.

STUDENT OBJECTIVES:

After completing this unit, the student will be able to:

1. Explain the purpose of MS-DOS and other operating systems.
2. Identify the types of MS-DOS commands and other operating system commands.
3. Explain the use of wildcards in a file specification.
4. Explain the purpose of JCL.

GENERALIZATION:

The student must understand the functional characteristics of computer operating systems before he/she can efficiently utilize the computer.

UNIT OVERVIEW

- I. Operating systems
  - A. Definitions
  - B. Concepts
- II. Review of simple DOS commands
  - A. DIR
  - B. COPY
  - C. DEL
  - D. RENAME
  - E. TYPE
  - F. FORMAT
- III. More DOS commands
  - A. CHKDSK
  - B. COMPDUPE
  - C. DISKCOPY
  - D. Directories
    - 1. MKDIR
    - 2. CHDIR
    - 3. RMDIR
    - 4. PATH
  - E. Batch files

IV. JCL

- A. Purpose of JCL
    1. Communicate with operating system
    2. Invoke program execution
    3. Manage data sets
- B. Creating JCL
    1. Syntax rules
    2. Statement order
- C. JCL errors
    1. Error meanings
    2. Correcting JCL errors

PURPOSES OF MS-DOS AND OTHER OPERATING SYSTEMS

Project 1

INSTRUCTIONS: Define the purpose of an operating system.

Project 2

INSTRUCTIONS: List and describe the different types of operating systems.

TYPES OF MS-DOS COMMANDS

INSTRUCTIONS: **Place the MS-DOS system master disk in drive A and your data disk in drive B. (Modify these instructions according to your classroom equipment.) Write the command needed to accomplish each of the following requests.**

1. List all files on the data disk.
2. List all the BASIC files on the data disk.
3. List a page at a time of the system master.
4. List only the file names on the data disk.
5. Copy FORMAT.COM to the data disk.
6. Copy all the Batch files to the data disk.
7. Delete all the Backup files on the data disk.
8. Delete the program PROG1.BAS on the data disk.
9. Rename the data file CHAP1PRG.CBL to C1PR3.CBL.
10. Look at the AUTOEXEC.BAT file.
11. Format the data disk.

12. Format the data disk and put the system command on it.

13. Format the data disk and put a label on it.

14. Check the data disk for errors.

15. Make a subdirectory called WORKAREA on the data disk.

16. Change to the subdirectory called WORD on the data disk.

17. Remove the subdirectory WORKB from the data disk. At the present, the directory has some files which are incorrect.

18. Set the path to search Drive B if the file is not found on Drive A.

19. Format and make a backup of the system master in one command.

20. Make a backup of the system master.

USES OF WILDCARDS

INSTRUCTIONS: Describe the uses of wildcards in file specifications.

PURPOSES OF JCL

Project 1

INSTRUCTIONS: Examine an already-created mainframe JCL for a program provided by your teacher. Annotate each statement with an explanation of what the statement does.

Project 2

INSTRUCTIONS: Select and read two articles from current periodicals about mainframe multi-user operating systems.

COMPETENCY TEST

PART I: PURPOSES OF MS-DOS

INSTRUCTIONS: Define and explain the purpose of the MS-DOS operating system.

PART II: PURPOSES OF MS-DOS COMMANDS

INSTRUCTIONS: **Describe what each of the following DOS commands do, and write out the complete name of the command if it is abbreviated.**

1. DIR

2. COPY

3. DEL

4. RENAME

5. TYPE

6. FORMAT

PART II: PURPOSES OF MS-DOS COMMANDS (Continued)

7. CHKDSK

8. COMPDUPE

9. DISKCOPY

10. MKDIR

11. CHDIR

12. RMDIR

13. PATH

PART III: USES OF WILDCARDS

INSTRUCTIONS: Explain the uses of wildcards in a file specification.

PART IV: PURPOSES OF JCL

Project 1

INSTRUCTIONS: Write a mainframe JCL statement which invokes a program.

Project 2

INSTRUCTIONS: Compare and contrast the concept of a multi-user operating system with a single-user (PC) operating system.

COMPETENCY CHECKLIST

ESSENTIAL ELEMENT: 75.87(h)(1)(E)

The student will be provided opportunities to: develop the ability to use advanced operating system concepts.

OBJECTIVE: Students will demonstrate the ability to use advanced operating system concepts on the computer available to them.	MASTERY	NON MASTERY
1. Explain the purpose of MS-DOS and other operating systems.	____	____
2. Identify the types of MS-DOS commands and other operating systems commands.	____	____
3. Explain the use of wildcards in a file specification.	____	____
4. Explain the purpose of JCL.	____	____
	____	____
	____	____
	____	____
	____	____

STUDENT NAME ____

SECTION IV

PROGRAM TESTING

ESSENTIAL ELEMENT

75.87(h)(3)

Concepts and skills related to program testing.

The student will be provided opportunities to:

A. develop test data and testing techniques;

B. apply test data to programs run on the computer; and

C. demonstrate the ability to debug and audit programs.

SUGGESTED UNIT LESSON PLAN

SECTION IV: PROGRAM TESTING

UNIT I: PROGRAM TESTING

ESSENTIAL 75.87
ELEMENT: (h)(3)(A)(B)(C)

ALLOCATED
TIME: 10 Hours

UNIT OBJECTIVE: Students will be able to explain the methods used in testing a program to ensure the program does what the user requests.

STUDENT OBJECTIVES: After completing this unit, the student will be able to:

1. Summarize the process of top-down program testing.
2. Create valid and invalid test data.
3. Use test data to check program logic while following a good test plan.
4. Compare the results of the computer test of the program with the test plan.
5. Make corrections to the program to eliminate errors in the test output.

FOCUS: Programs must be tested to ensure that the computer system used by a company is reliable and as error-free as possible. To test a program, programmers must:

1. Develop a systematic plan for testing a program and checking the results.
2. Create sample data records for later use with the program being developed.
3. Run the program following the test plan using the test data they created.
4. Compare the program output with the test plan to ensure that the program has been properly designed and coded.
5. Determine the cause of errors in the program test, correct the program code, and rerun the program test to eliminate run-time errors.

DOMAIN: Activities and competency tests have been designed to provide learning experiences utilizing the affective, cognitive, and/or psychomotor domains.

BASIC SKILLS: Activities and competency tests have been designed to reinforce the basic skills of reading, writing, and/or mathematics.

CONTENT OUTLINE

I. Purpose of test plan
  A. Good data -- check a few records to see if general logic works
  B. Numeric data -- check calculations
  C. Invalid records -- test error traps
  D. Large volume of data
II. Top-down testing
  A. Concepts
  B. Value of top-down testing
III. Constructing a test plan
  A. Decide what needs to be tested
  B. Construct data records to test aspects of program
  C. Play computer with each data record, and write down what record should produce as output
IV. Creating test data (valid records)
  A. Purpose of program
  B. Input data layout
  C. Alpha, numeric placement with variables
V. Creating test data (invalid records)
  A. Data validation concepts
  B. Determining invalid variables
VI. Supplying test data with program for computer system being used
  A. Mechanics of where to place test data
  B. Mechanics of how to access test data
VII. Interpreting computer output
  A. Computer specifics regarding how output is presented
  B. Checking output against test plan
VIII. What to look for when comparing computer output to test plan
  A. Report layout follows specifications
  B. Calculated results match test plan
  C. Processing matches test plan
  D. Total are correct
  E. All records are processed
IX. Common errors to look for when debugging a program
  A. Variables are wrong lengths, including decimal places
  B. Input, output descriptions do not match specifications
  C. Variables are not properly initialized
  D. Wrong data set is used for test
  E. Calculations are miscoded
  F. No write statement is used
  G. No read statement is used
  H. No data is supplied
  I. "IF's" are coded incorrectly

X. Destructive testing
   A. ABEND concepts
   B. ABEND information
   C. Locating program statement which caused ABEND
   D. Common ABEND error messages and their meanings
   E. Using error message manuals
XI. Making corrections
   A. Solve ABEND problems, then logic problems
   B. Concentrate on one problem at a time
   C. Get one error corrected, then tackle next output error
XII. Debugging aids
   A. Error messages from ABEND
   B. Using a trace
   C. Displaying memory contents
   D. Using dumps

SUGGESTED TEACHER ACTIVITIES

General Teacher Preparations

1. Preview the unit and review objectives.
2. Decide on a variety of instructional methods to present the unit.
3. Prepare questioning techniques and closure statements.
4. Make modifications in curriculum for special needs students.
5. Consult several alternative sources to enhance and update your knowledge of the current trends, issues, and processes related to the unit content.
6. Select exercises, drills, and other resources to use as supplemental materials for the unit.
7. Secure and prepare sufficient quantities of software backup diskettes for student use.
8. When appropriate, take a field trip or have a guest speaker present a portion of the unit describing industry standards.
9. Prepare appropriate bulletin boards and transparencies.
10. Make copies of appropriate handouts, activities, and test materials.
11. Secure overhead projector, LCD computer panel for data projection, and an appropriate screen.

General Classroon Preparations

1. Secure the students' attention.
2. Communicate learning expectations--what is to be accomplished.
3. Emphasize the value/importance of the unit content or activity.
4. Relate unit content to prior or future learning.
    a. Use discussions and pretests to determine prior knowledge of the unit content.
    b. From the results of the discussions and pretests, modify your teaching plans to fit the student needs.
    c. Use enthusiasm, and relate the content to the student's interests.

Reteach Activities

1. Use a new method to reteach a unit activity.
2. Using additional resources, create individualized materials for the more and less capable students.
3. Utilize those sections of tests which need additional reinforcement.
4. Utilize unit activities not previously used.
5. Use peer practice for the reteaching of terminology--one student asks about the meaning of the word. The other student has the list of answers (words). Hints will be given until the word is matched with its correct definition.

Specific Teaching Activities

(NOTE: An ABEND error is an acronym for abnormal ending error.)

Activity One

Project 2	Provide a plan for a top-down test walkthrough.
Project 3	Provide four program outputs produced by the same program at different levels.

Activity Two

Project 1	Prepare an incorrect output printout of a program and a written description of the correct output.
Project 2	Prepare a program and five (5) valid data records.
Project 3	Prepare a program and three (3) invalid data records.
Project 4	Prepare an input data layout.

Activity Three

Project 1	Prepare programs for use in checking general logic.
Project 2	Prepare a program with logic error.

Activity Four

Project 1	Develop a test plan and a program output with errors.
Projects 3-4	Prepare two programs with ABEND errors, one that has the ABEND statement labeled with system information, and the other in which the ABEND is unlabeled.

Activity Five

Project 2	Prepare a program with an ABEND error that students will run in order to determine the error.
Project 3	Prepare a list of ABEND error messages and a reference manual.

Competency Test

Part 2

Project 2	Prepare correct and incorrect versions of the same program output.
Project 3	Provide program input specifications.
Project 4	Provide valid and invalid input records, and a simple program listing.

Part 3

Project 1	Prepare test data and a program for students to run in order to check program logic.

Part 4

Project 1	Prepare a program containing a logic error, and a short list of the probable causes of the logic error.
Project 2	Prepare a test plan and test data for student use in correcting an original program.
Project 3	Prepare a program containing an ABEND (abnormal ending) error which students are to correct.

ANSWERS TO ACTIVITIES

Activity One

Project 1	The top-down program testing process identifies the basic program functions and divides them into modules. Description will vary depending upon the textbook used, and on the teacher's lecture. Evaluate to the satisfaction of the instructor.
Projects 2-3	Evaluated to the satisfaction of the instructor.

Activity Two

Projects 1-5	Evaluated to the satisfaction of the instructor.

Activity Three

Projects 1-2	Evaluated to the satisfaction of the instructor.

Activity Four

Projects 1-4	Answers will vary depending on JCL provided. Evaluate to the satisfaction of the instructor.

Activity Five

Projects 1-3	Evaluated to the satisfaction of the instructor.

COMPETENCY TEST ANSWERS

Part 1

Answers will vary depending upon the textbook used, and on the teacher's lecture. Evaluate to the satisfaction of the instructor, but the answer should include the following points:

Values of top-down testing:
Complexity is reduced with each program test
Problem to solve is less overwhelming

Part 2

Project 1

1. range checks
2. alpha checks
3. numeric checks
4. limit checks

Projects 2-4 Evaluated to the satisfaction of the instructor.

Part 3

Projects 1-2 Evaluated to the satisfaction of the instructor.

Part 4

Projects 1-3 Evaluated to the satisfaction of the instructor.

SECTION IV: PROGRAM TESTING

UNIT I: PROGRAM TESTING

UNIT OBJECTIVE:

Students will be able to explain the methods used in testing a program to ensure that the program does what the user requests.

STUDENT OBJECTIVES:

After completing this unit, the student will be able to:

1. Summarize the process of top-down program testing.
2. Create valid and invalid test data.
3. Use test data to check program logic while following a good test plan.
4. Compare the results of the computer test of the program with the test plan.
5. Make corrections to the program to eliminate errors in the test output.

GENERALIZATION:

Programs must be tested to ensure that the computer system used by a company is reliable and as error-free as possible. To test a program, programmers must:

1. Develop a systematic plan for testing a program and checking the results.
2. Create sample data records for later use with the program being developed.
3. Run the program following the test plan using the test data they created.
4. Compare the program output with the test plan to ensure that the program has been properly designed and coded.
5. Determine the cause of errors in the program test, correct the program code, and rerun the program test to eliminate run-time errors.

UNIT OVERVIEW

I. Purpose of test plan
  A. Good data--check a few records to see if general logic works
  B. Numeric data--check calculations
  C. Invalid records -- test error traps
  D. Large volume of data

II. Top-down testing
  A. Concepts
    1. Code and test main logic with good data
    2. Incrementally add more complexity -- code and test
    3. Add error trapping procedures -- code and test
  B. Value of top-down testing
    1. Complexity is reduced with each program test
    2. Problem to solve is less overwhelming

III. Constructing a test plan
  A. Decide what needs to be tested
  B. Construct data records to test aspects of program
  C. Play computer with each data record, and write down what record should produce as output

IV. Creating test data (valid records)
  A. Purpose of program
  B. Input data layout
  C. Alpha, numeric placement with variables

V. Creating test data (invalid records)
    A. Data validation concepts
        1. range checks
        2. alpha checks
        3. numeric checks
        4. limit checks
        5. reason for use of programming checks
    B. Determining invalid variables

VI. Supplying test data with program for computer system being used
    A. Mechanics of where to place test data
    B. Mechanics of how to access test data

VII. Interpreting computer output
    A. Computer specifics regarding how output is presented
    B. Checking output against test plan

VIII. What to look for when comparing computer output to test plan
    A. Report layout follows specifications
        1. heading, detail lines
        2. correct spacing
    B. Calculated results match test plan
    C. Processing matches test plan
        1. IF-THEN-ELSE paths are correct
        2. Invalid records are handled properly
    D. Totals are correct
    E. All records are processed

IX. Common errors to look for when debugging a program
   A. Variables are wrong lengths, including decimal places
   B. Input, output descriptions do not match specifications
   C. Variables are not properly initialized
   D. Wrong data set is used for test
   E. Calculations are miscoded
   F. No write statement is used
   G. No read statement is used
   H. No data is supplied
   I. "IF's" are coded incorrectly

X. Destructive testing
   A. Abend concepts
   B. Abend information
   C. Locating program statement which caused abend
   D. Common abend error messages and their meanings
   E. Using error message manuals

XI. Making corrections
   A. Solve abend problems, then logic problems
   B. Concentrate on one problem at a time
   C. Get one error corrected, then tackle next output error

XII. Debugging aids
   A. Error messages from abend
   B. Using a trace
   C. Displaying memory contents
   D. Using dumps

TOP-DOWN PROGRAM TESTING PROCESS

Project 1

INSTRUCTIONS: In your own words, describe the top-down program testing process.

Project 2

INSTRUCTIONS: Walkthrough a top-down test plan with your teacher.

Project 3

INSTRUCTIONS: Your teacher will provide you with four program outputs produced by the same program. Indicate the order in which they were produced, following a top-down testing plan, from the lowest level of complexity to the highest level of complexity, which is the completed program.

VALID AND INVALID TEST DATA

Project 1

INSTRUCTIONS: Your teacher will provide you with an incorrect output printout of a program and with a written description of the correct output. Highlight the invalid parts of the incorrect program output.

Project 2

INSTRUCTIONS: Using an appropriate program assigned by your teacher, along with five valid data records, write a brief description of what output will be produced by each record.

Project 3

INSTRUCTIONS: Using an appropriate program assigned by your teacher, along with three invalid data records, write a brief description of what output will be produced by each record.

Project 4

INSTRUCTIONS: Your teacher will assign a completion time and will provide you with an input data layout. Work with the members of your team to produce five valid records and three invalid records to use in a program using the time allocated.

Project 5

INSTRUCTIONS: Exchange the test data records you produced in Project 4 with those of another team, and diagram output results for each valid and invalid record given.

USING TEST DATA TO CHECK PROGRAM LOGIC

Project 1

INSTRUCTIONS: Secure programs from your teacher. Proceed to run the first test of the program with only the general logic coded. Check results, such as report/screen layout, if all records were processed, etc.

Project 2

INSTRUCTIONS: Run a program provided by your teacher which contains a logic error. Supply at least one probable cause of such a logic error.

COMPARISON BETWEEN PROGRAM RESULTS AND TEST PLAN

Project 1

INSTRUCTIONS: Your teacher will provide you with a test plan and a program output with errors. Indicate where program output disagrees with the test plan, and describe the type of error made. At least one error of each type will be included, such as wrong calculation, wrong output location, heading constant incorrect, wrong spacing, etc.

Project 2

INSTRUCTIONS: Using the five valid records created in Activity 2, follow a test plan, run an appropriate program, and check the results.

Project 3

INSTRUCTIONS: Examine program output containing an abend which has been labeled with the information supplied by the system when the abend occurred. Use this information to locate the problem in the program.

Project 4

INSTRUCTIONS: A program output containing an abend will be furnished by your teacher. Determine which statement caused the abend.

CORRECTION OF ERRORS IN TEST OUTPUT

Project 1

INSTRUCTIONS:	Review the literature on data validation. From your reading, list at least four types of error checking techniques.

Project 2

INSTRUCTIONS:	Run a program supplied by your teacher which contains an error forcing abend. Locate the problem, make correction, and retest.

Project 3

INSTRUCTIONS:	You will be provided with at least two abend messages. Locate the messages in a reference manual, and write down the information you found in the manual.

COMPETENCY TEST

PART I: TOP-DOWN PROGRAM TESTING PROCESS

INSTRUCTIONS: Explain the difference between top-down testing and testing the complete program all at once.

PART II: VALID AND INVALID TEST DATA

Project 1

INSTRUCTIONS: List at least four data validation techniques.

1.

2.

3.

4.

Project 2

INSTRUCTIONS: Your teacher will provide you with invalid output and with the correct output. Highlight the discrepencies in the two listings.

Project 3

INSTRUCTIONS: Create one valid and one invalid record for a given program specification provided by your teacher.

Project 4

INSTRUCTIONS: Using the set of records which contains both valid and invalid records provided by your teacher, identify which records will produce valid output and invalid output by using a simple program listing.

PART III: USING TEST DATA TO CHECK PROGRAM LOGIC

Project 1

INSTRUCTIONS: Using the test data and a program provided by your teacher, run the data to check the program logic.

Project 2

INSTRUCTIONS: Explain the difference between a logic error and an abend error in a program.

PART IV: COMPARISON BETWEEN PROGRAM RESULTS AND TEST PLAN

Project 1

INSTRUCTIONS: You will be provided with a program containing a logic error and with a short list of the probable causes of the logic error. Locate the cause of the error in the listing, correct the program, and rerun the program to produce the correct output.

Project 2

INSTRUCTIONS: Successfully locate discrepancies in your own program output using a test plan, and test the data supplied by your teacher. Correct the program and rerun it to produce the correct output.

Project 3

INSTRUCTIONS: Correct a program, provided by your teacher, which contains an abend. Rerun the program to produce the correct output.

COMPETENCY CHECKLIST

ESSENTIAL ELEMENT:

75.87(h)(3)(A)(B)(C)

The student will be provided opportunities to: develop test data and testing techniques; apply test data to programs run on the computer; and demonstrate the ability to debug and audit programs.

OBJECTIVE: Students will be able to explain the methods used in testing a program to ensure that the program does what the user requests.	MASTERY	NON MASTERY
1. Summarize the process of top-down program testing.	________	________
2. Create valid and invalid test data.	________	________
3. Use test data to check program logic while following a good test plan.	________	________
4. Compare the results of the computer test of the program with the test plan.	________	________
5. Make corrections to the program to eliminate errors in the test output.	________	________
	________	________

STUDENT NAME ______________________________

UNIT WILL BE PREPARED DURING 1988-89 PROJECT YEAR

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APPENDIX A

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Horizons Unlimited
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Houghton Mifflin
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Hanover, NH 03755

Houghton Mifflin Company
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Individual Software, Inc.
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Foster City, CA 94404
(415) 341-6116

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(609) 924-7272

Instructional Development Systems
2927 Virginia Beach, VA 23452
(804) 340-1977

Instructional Software, Inc.
1278 Massachusetts Ave.
Cambridge, MA 02138
(617) 492-0386

Instructor's Computer Directory
Instructor Publications
545 5th Ave.
New York, NY 10017

Instructor's Computer Directory for Schools
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(212) 503-2888

International Bureau of
Software Testing
536 Wendell, Suite 7
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International Micro Systems
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Lenexa, KS 66215
(913) 888-8330

Interpretive Education
2306 Winters Drive
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(616) 345-8681

Interpretive Education Incorporated
157 S. Kalamazoo Mall
Suite 250
Kalamazoo, MI 49007
(616) 345-8681

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Lawrence Hall of Science
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P.O. Box 179
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(316) 682-6594

Learning Services
61 West Eighth St.
P.O. Box 10636
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Library Software
P.O. Box 23897
Pleasant Hill, CA 94523

Lotus Development Corp.
55 Cambridge Parkway
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Microcomputer Division
55722 Santa Fe Trail
Yucca Valley, CA 92284
(714) 365-9718

McGraw-Hill Book Company
School Division
1221 Avenue of the Americas
New York, NY 10020
(800) 223-4180
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MECC
3490 Lexington Ave. North
Saint Paul, MN 55126-8097

Micro-Comp Incorporated
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Microcomputer Software
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MICRO-ED, Inc.
P.O. Box 24156
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Micro Learningware
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16011 NE 36th Way
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Milliken Publishing Company
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Mindscape
3444 Dundee Road
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Minnesota Curriculum Services Center
3554 White Bear Avenue
White Bear Lake, NM 55110
(612)770-3943

Minnesota Educational Computing
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2520 Broadway Drive
St. Paul, MN 55113
(800) 631-8112

Muse Software
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NCCD (National Coordinating Center
for Curriculum Development)
State University of New York
Stony Brook, NY 11794
(516) 246-8418

National Software Marketing
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Norton Computing
2210 Wilshire Blvd. #186
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New Canaan, CT 06840

On-Line Systems
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Coarsegold, CA 93614
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Optical Data Corp.
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Pismo Beach, CA 93449
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Pilisbury Center
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Minneapolis, MN 55402
(612) 330-8732

Precision People, Inc.
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New Millford, CT 06776

Quality Educational Designs
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Portland, OR 97212
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Reston, VA 22190
(703) 437-8900

Scholastic, Inc.
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Englewood Cliffs, NJ 07632

School Microware
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Dresden, ME 04342
(207) 737-4466

Silicon Express
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Columbus, OH 43213

Social Science Software
17408 N.E. 19th Place
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(206) 747-0948

3R Software
P.O. Box 3115
Jamaica, NY 11431

The Software Exchange
6 South Street, Box 68
Milford, NH 03055
(603) 673-5144

Software Industries
902 Pinecrest
Richardson, TX 75080

Software Publishing Corp.
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Mountian View, CA 94043

Southern Computer Systems , Inc.
P.O. Box 55473
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Cincinnati, OH 45227
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Springboard Software Inc.
7808 Creekridge Circle
Minneapolis, MN 55435

John Steffee, Inc.
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7901 South IH-35
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(512) 282-6840

Stoneware
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San Rafael, CA 94901
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Phoenix, AZ 85018
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22 Seward Drive
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Teaching Tools
P.O. Box 12679
Research Triangle Park, NC 27709
(919) 851-2374

Teacher's Pet
c/o Glenn Fisher
1517 Holly Street
Berkeley, CA 94703

Time Share Corp.
Hanover, NH 03775
(603) 488-3838

TYC Software
40 Stuyvesant Manor
Geneseo, NY 14454
(716) 243-3005

Versa CAD Corp.
7372 Prince Drive
Huntington Beach, CA 92647

Visicorp
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San Jose, CA 95134
(408) 946-9000

Vocational Agriculture Service
College of Agriculture
University of Illinois
1401 S. Maryland Drive
Urbana, IL 61801
(217) 333-3873

Vocational Media Associates
Mount Kisco, NY 10549

J. Weston Walch, Publisher
321 Valley St., P.O. Box 658
Portland, Maine 04104-0658

Walt Disney Educational Media Co.
500 S. Buena Vista St.
Burbank, CA 91521

Westinghouse Learning Corp.
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Oak Lawn, IL 60453

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2071 Tenth Avenue
San Francisco, CA 94116

WordPerfect
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MICROCOMPUTER DIRECTORIES

APPLE COMPUTER EDUCATION SOFTWARE DIRECTORY
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4170 Grove Avenue
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Describes nearly 1100 software packages in 19 subject categories from elementary through college level. Also includes administrative, office, and utility applications packages.

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Vital Information, Inc.
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Chicago, IL 60639
(312) 622-9606 $9.95
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THE BOOK OF APPLE SOFTWARE
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or available from
ADDISON-WESLEY PUBLISHING COMPANY
Reading, MA 01867 $19.95 per volume
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THE COMMODORE SOFTWARE ENCYCLOPEDIA
Commodore Corporate Offices
Educational Department
487 Devon Park Drive
Wayne, PA 19087
(continued)
(215) 687-9750 $9.95
Available at local Commodore dealers or from software publishers. Special education section lists approximately 740 programs from various software publishers. Only Commodore-approved software listed.

EDUCATIONAL SOFTWARE DIRECTORY
Sterling Swift Publishing Co.
1600 Fortview Road
Austin, TX 78704
Apple software only.

EDUCATORS HANDBOOK AND SOFTWARE DIRECTORY
Vital Information, Inc.
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Overland Park, KS 66024 $19.95
Contains 1500 program descriptions in 12 major subject categories indexed by title, subject, grade level, and publisher. Also includes articles, a guide to obtaining funding and grants, a list of user groups, and more.

GAMCO MICROCOMPUTER SOFTWARE
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Big Spring, TX 79720-0120
(915) 267-6327 Free
Contains lists and descriptions by microcomputer and subject area. For Apple, PET, TRS-80.

INTERNATIONAL MICROCOMPUTER SOFTWARE DIRECTORY
Imprint Software
420 So. Howest St.
Ft. Collins, CO 80521
(800) 525-5992 $29.95
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Comprehensive list of products available for the IBM-PC or IBM-PC compatible computers.

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Discovery Park
University of Victoria
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Cross references over 1000 educational software programs; some programs are evaluated.

THE SOFTWARE DIRECTORY
Software Central
P.O. Box 30424
Lincoln, NE 68503
Includes a special section of educational software; programs are briefly described.

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BASIC PROGRAMMING
INFORMATION PROCESSING
INTRODUCTION TO MICROCOMPUTER APPLICATIONS
MICROCOMPUTER BUSINESS APPLICATION

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East Texas State University
(214) 886-5624

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PROFESSIONAL ORGANIZATIONS

American Federation of Information Processing Societies, Inc.
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Arlington, VA 22209

American Society for Information Science
1155 16th Street, N.W.
Washington, D.C. 20036
(202) 659-3644

American Society for Training and Development
P.O. Box 5307
Madison, WI 53705

Association for Computer Users (ACU)
1133 Avenue of the Americas
New York, NY 10036
(212) 265-6309

Association for Educational Communications and Technology (AECT)
1126 16 Street, N.W.
Washington, D.C. 20036
(202) 833-4180

Association for Educational Data Systems
(AEDS)
1201 16th Street, N.W.
Washington, D.C. 20036
(202)833-4100

Association for the Development of Computer-Based Instructional
Systems (ADCIS)
Bond Hall
Western Washington University
CF Computer Center
Bellingham, WA 98225
(206) 676-2860

Computer-Based Education Research Laboratory
University of Illinois
Urbana, IL 61801

Computer-Using Educators
% W. Don McKell
Independence High School
1776 Educational Park Drive
San Jose, CA 95133

Council for Educational Development and Research
1518 K Street, N.W.
Suite 206
Washington, D.C.

Datapro Research Company
1805 Underwood Blvd.
Delran, NJ 08075
(800) 257-9406

Educational Technology Center
University of California
Irvine, CA 92717
(714) 833-6911

EDUCOM
P.O. Box 364
Princeton, NJ 08540
(609)734-1915

International Council for Computers in Education (ICCE)
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University of Oregon
Eugene, OR 97403

Laboratory for Personal Computers in Education
State University of New York
Stony Brook, NY 11094
(516) 246-8418

MicroSOFT
Northwest Regional Educational Laboratory
500 Lindsay Building
710 2nd Avenue, S.W.
Portland, OR 91204
(503)248-6974

Microcomputer Center
San Mateo Educational Resources Center
Library
333 Main Street
Redwood City, CA 94063
(415) 363-5469

Microcomputer Education Applications Network
256 North Washington Street
Falls Church, VA 22046

Microcomputer Resource Center
Teachers College
Columbia University
New York, NY 10027
(212) 678-3740

Minnesota Eucational Computing
Consortium (MECC)
2520 Broadway Drive
St. Paul, MN 55113
(612) 376-1101

National Association of Computer Stores
3255 South U.S.1
Fort Pierce, FL 33450
(305) 465-9450

National Education Association
1201 16th Street, N.W.
Washington, D.C. 20036

Texas Computer Education Association
7131 Midbury
Dallas, TX 75230
(214) 361-9472

APPENDIX B

OFFICE EDUCATION

OCCUPATIONAL SPECIFIC COURSES (GRADES 11 & 12)

BUSINESS INFORMATION PROCESSING (1-3 credits)

Introduces the basic concepts and skills for production of business documents and correspondence. Special emphasis is placed on automated management of business records, database management information flow, electronic mail, desktop publishing, electronic bulletin boards, graphics, and on-line information services. This is an occupational specific course that prepares the student for employment or advanced standing at the post secondary level.

OFFICE ADMINISTRATION (1-3 credits)

Includes advanced concepts and skills necessary for in a general office position through a simulated office environment. Special emphasis is placed on keyboarding, records management, communications, operation of office machines, and the electronic production of business documents. This is an occupational specific course that prepares the student for office employment.

BUSINESS COMPUTER APPLICATIONS I (1-3 credits)

Introduces the basic concepts and skills related to general data processing. Special emphasis is placed on basic computer operations, information processing, applying the general capabilities of database management, and demonstrating basic electronic spreadsheet concepts and other business application software. This course is designed to lay a foundation for further occupational computer applications instruction in business computer applications II.

BUSINESS COMPUTER APPLICATIONS II (1-3 credits)

Includes advanced concepts and skills related to general data processing. Special emphasis is placed on teleprocessing and integrated software systems, computer operations, computer generated graphics, algorithmic approaches to problem solving, and programming. This course is an occupational specific course that prepares the student for employment in a business computer occupation or advanced standing at the post secondary level.

BUSINESS COMPUTER PROGRAMMING I (1-3 credits)

Introduces the basic concepts and skills related to business computer programming. Special emphasis is placed on programming concepts and language, programming methodology, skills related to data storage, and an awareness of programming applications for business. This course is designed to lay a foundation for further occupational specific business programming instruction.

BUSINESS COMPUTER PROGRAMMING II (1-3 credits)

Includes advanced concepts and skills related to business computer programming. Special emphasis is placed on bringing development efforts to full production status in environments and language commonly used in development of commercial software for business applications. Concepts such as design, maintenance, testing, team development, and user documentation are included. This course prepares students for employment in a computer related occupation or advanced placement at the post secondary level.

CLUSTER COURSES (GRADES 10, 11, & 12)

MICROCOMPUTER APPLICATIONS (1/2 OR 1 credit)

Introduces basic concepts and skills related to micro-computer systems. Special emphasis is placed on word processing, data base design, electronic spreadsheet, and numeric data. Included will be introductions to new, emerging information processing tools such as telecommunications and integrated software, transporting of text and images, and desktop publishing. This course provides students with an overview of the various uses of information processing tools and skill development in using micro-computer-based tools for personal, academic, and/or employment.

OFFICE SUPPORT SYSTEMS (1/2 OR 1 credit)

Introduces the basic concepts and skills needed for general office position. Instruction and skill development are provided in keyboarding, filing, financial activities, office machines, and securing and maintaining employment. This course provides students with an overview and understanding of office skills for entry level employment or preparation for advancement into an occupational specific course.

BUSINESS FINANCIAL APPLICATIONS (1/2 OR 1 credit)

Introduces the basic concepts and skills necessary for employment in a financial institution. Special emphasis will be placed on banking operations, credit administration, types of loans, legal aspects of banking, and other financial institutions. This course provides the students with an overview and understanding of the banking industry which may be used for an entry level position or advancement into an occupational specific course.

*Students pursuing the advanced program may substitute this course in lieu of computer science.

CVAE/VEH COURSES (GRADES 7-12)

BUSINESS OFFICE SERVICES (1-3 credits)

Introduces basic concepts and skills needed for a general office position with concentration on the use of reprographic equipment, keyboarding, filing, and office machines. Special emphasis is placed on remediation in the areas of basic math and English usage, as well as securing and maintaining employment.

BUSINESS OFFICE CLERICAL (1-3 credits)

Introduces basic concepts and skills needed for a general office position with concentration on the use of keyboarding, filing, and office machines. Special emphasis is placed on remediation in the areas of basic math and English usage, as well as securing and maintaining employment.

APPENDIX C

COMMON ESSENTIAL ELEMENTS
for all
OFFICE EDUCATION PROGRAMS

75.87 Office Education

(a) The elements in this subsection are common to office education programs and shall be included in each course at the appropriate level. They are described here to preclude repetition in each course. Every school offering office education shall provide courses which include the following essential elements:

(1) Leadership concepts and skills. The student shall be provided opportunities to:

(A) demonstrate skills, characteristics, and responsibilities of leaders and effective group members;

(B) demonstrate a knowledge of parliamentary procedure principles;

(C) plan and conduct leadership activities; and

(D) prepare for effective citizenship and for participation in our democratic society.

(2) Concepts and skills related to successful employment and/or postsecondary training. The student shall be provided opportunities to:

(A) identify employment opportunities and preparation requirements in the chosen field;

(B) identify effective methods to secure and terminate employment;

(C) demonstrate effective communication skills both oral and written, and follow through on assigned tasks;

(D) demonstrate dependability and punctuality;

(E) demonstrate productive work habits and attitudes;

(F) understand the importance of taking pride in the quality of work performed;

(G) recognize the dignity in work;

(H) develop skills in planning and organizing work;

(I) apply required methods and sequences when performing tasks;

(J) apply principles of time management and work simplification when performing assigned tasks;

(K) identify ethical practices and responsibilities; and

(L) understand the importance of the application of organizational policies and procedures.

(3) Concepts and skills associated with entrepreneurship. The student shall be provided opportunities to:

(A) identify opportunities for business ownership;

(B) understand the risk and profit motive factor;

(C) understand the elements and advantages of the free enterprise system; and

(D) explain the role of small business in the free enterprise system.

(4) Concepts and skills related to safety and safe working conditions. The student shall be provided opportunities to identify and apply safe working practices to all training situations.

(5) Concepts and skills associated with human relations and personality development. The student shall be provided opportunities to:

(A) understand the importance of maintaining good health and proper appearance for effective job performance;

(B) understand oneself and others;

(C) exercise self-control;

(D) accept and use criticism;

(E) recognize basic human relationships as they relate to business success; and

(F) demonstrate characteristics for successful working relationships.

(6) Concepts and skills related to personal and business management. The student shall be provided opportunities to:

(A) explain how management assists in reaching personal and family goals;

(B) explain the management process;

(C) describe the role of management in controlling stress;

(D) identify and understand personal checking accounts;

(E) identify and understand personal loan application processes;

(F) identify and understand different financial institutions;

(G) identify the role and functions of business management;

(H) understand the lines of authority; and

(I) identify effective supervisory techniques.

OFFICE EDUCATION ESSENTIAL ELEMENTS

OFFICE ADMINISTRATION

75.87

(b) Office administration (one, two, or three units) shall include the following essential elements:

(1) Concepts and skills involved in keyboarding in office administration. The student shall be provided opportunities to:

(A) recognize proofreader's marks and use them in editing;

(B) demonstrate the ability to apply basic touch keyboarding skills;

(C) demonstrate procedures necessary in keyboarding business documents; and

(D) demonstrate the ability to enter, manipulate, and retrieve data on a microcomputer.

(2) Concepts and skills necessary for records control and management in office administration. The student shall be provided opportunities to:

(A) identify correct usage in applying terminology and procedures for indexing, coding, and filing using the alphabetic, numeric, subject, and geographic system;

(B) identify, describe, and/or demonstrate procedures for controlling manual and automated records; and

(C) identify the procedures of handling incoming and outgoing mail.

(3) Concepts and skills necessary for the operation of office machines in office administration. The student shall be provided opportunities to:

(A) use the touch system on the electronic calculator to compute mathematical business problems, including petty cash, banking, and payroll accurately;

(B) identify correct procedures for producing legible copies; and

(C) produce accurate, legible business forms and business correspondence on the electronic typewriter and/or computer.

(4) Concepts and skills necessary for effective communication in office administration. The student shall be provided opportunities to:

(A) identify proper techniques in business telephone usage;

(B) prepare effective written communication using the document production cycle;

(C) identify and use language skills relating to business; and

(D) identify terminology relating to basic business, information processing, and computer applications.

OFFICE EDUCATION ESSENTIAL ELEMENTS

BUSINESS INFORMATION PROCESSING

75.87

c) Business information processing (one, two, or three units) shall include the following essential elements:

- (1) Concepts and skills related to effective communication and production of business documents. The student shall be provided opportunities to :
  - (A) demonstrate proficiency in business English, spelling, and proofreading;
  - (B) identify and apply correct format for business correspondence and documents;
  - (C) demonstrate basic information processing concepts and processes to employ the appropriate steps in document production;
  - (D) demonstrate proficiency in transcription;
  - (E) identify and use computer-based tools for document production;
  - (F) demonstrate basic knowledge and usage of business machines; and
  - (G) identify proper techniques in business telephone usage.
- (2) Concepts and skills related to business records management. The student shall be provided opportunities to:
  - (A) identify procedures for controlling manual records by applying terminology and procedures for indexing, coding, and filing alphabetically;
  - (B) identify and apply procedures for automated management of business records, at least including use of database management software for storage, retrieval, manipulation, selection, and reporting of records;
  - (C) identify business applications of electronic spreadsheets and understand and/or demonstrate fundamental concepts and operational procedures related to their use.
- (3) Concepts and skills related to management of information flow out of, into, and within an office. The student shall be provided opportunities to:
  - (A) understand concepts related to computer-aided preparation and distribution of personalized correspondence, at least including use of mail merge and electronic mail;
  - (B) identify tools for preparing information for mass distribution, at least including desktop publishing, production of presentation graphics, and maintenance of electronic bulletin boards;

(C) understand the concepts of using communication systems both for accessing remotely stored information (at least including use of on-line information services) and for transmission of outgoing information; and

(D) understand concepts related to transporting of images electronically.

(4) Identify characteristics of contemporary office systems related to information processing and management. The student shall be given opportunities to:

(A) observe office activity related to information processing and information management;

(B) discuss responsibilities and procedures involved in business information processing with individuals working in the field;

(C) read and discuss current literature related to business information processing; and

(D) identify emerging information processing tools and understand their impact on business information processing.

OFFICE EDUCATION ESSENTIAL ELEMENTS

BUSINESS OFFICE SERVICES

75.87

(d) Business office services (one, two, or three units) shall include the following essential elements:

- (1) concepts and skills related to business office services. The student shall be provided opportunities to:
  - (A) identify and demonstrate image processing for duplicating;
  - (B) demonstrate the procedures and equipment used in completing layouts and masters for reprographics;
  - (C) identify and demonstrate the procedures used in operating reprographic equipment;
  - (D) identify and demonstrate the use of the machines used in bindery operations;
  - (E) demonstrate the ability to keyboard materials for duplication;
  - (F) demonstrate the ability to solve mathematical problems using the touch method on the electronic calculator;
  - (G) identify and use correct mailing procedures; and
  - (H) identify and practice the correct procedures in alphabetic filing.
- (2) Concepts and skills related to the procedures of handling mail. The student shall be provided opportunities to identify and/or use correct mailing procedures.

OFFICE EDUCATION ESSENTIAL ELEMENTS

BUSINESS COMPUTER APPLICATIONS I

75.87

(e) Business Computer Applications I (one, two, or three units) shall include the following essential elements:

(1) Concepts and skills related to general data processing. The student shall be provided opportunities to:

(A) demonstrate comprehension of data processing terms;

(B) identify the major components of data processing;

(C) identify and apply the functions of an operating system;

(D) demonstrate the ability to enter, manipulate, and retrieve data on a computer terminal; and

(E) understand concepts of networked and multi-user configurations.

(2) Concepts and skills related to information processing. The student shall be provided opportunities to:

(A) demonstrate basic information processing concepts; and

(B) apply general capabilities of information processing tools and software.

(3) Concepts and skills related to spreadsheets. The student shall be provided opportunities to:

(A) demonstrate basic spreadsheet concepts; and

(B) apply general capabilities of spreadsheets.

(4) Concepts and skills related to database management. The student shall be provided opportunities to:

(A) demonstrate basic database concepts, procedures, and capabilities; and

(B) apply general capabilities of database management.

(5) Concepts and skills related to business application software. The student shall be provided opportunities to demonstrate the ability to use automated business application concepts, principles, and practices in realistic situations.

(6) Concepts and skills related to computer operations. The student shall be provided opportunities to:

(A) observe and/or participate in computer activities in business and industry;

(B) understand responsibilities and procedures involved in computer operations with individuals working in the field; and

(C) identify emerging computer tools and understand their impact on business and industry.

OFFICE EDUCATION ESSENTIAL ELEMENTS

BUSINESS COMPUTER APPLICATIONS II

75.87

(f) Business Computer Applications II (one, two, or three units) shall include the following essential elements:

(1) Concepts and skills related to teleprocessing. The student shall be provided opportunities to:

(A) describe the basic components of a teleprocessing system;

(B) demonstrate an understanding of network organization; and

(C) understand and identify the use of teleprocessing system for data exchange in an actual business setting.

(2) Concepts and skills related to integrated systems. The student shall be provided opportunities to:

(A) understand and identify the advantages, capabilities, and functions of integrated software systems;

(B) manipulate data through the use of an integrated system; and

(C) use integrated systems to merge data from different applications.

(3) Concepts and skills related to graphics. The student shall be provided opportunities to:

(A) analyze and interpret business graphs and charts; and

(B) demonstrate graphic representation of data.

(4) Concepts and skills related to algorithmic approaches to problem solving. The student shall be provided opportunities to:

(A) demonstrate the ability to solve problems using appropriate analytical techniques; and

(B) demonstrate an awareness of the phases related to systems analysis and design.

(5) Concepts and skills related to applying logic to programming. The student shall be provided opportunities to:

(A) apply the appropriate analytical techniques to solving programming problems;

(B) translate the applied solution into a common programming or macro language; and

(C) demonstrate the ability to debug and audit a solution.

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OFFICE EDUCATION ESSENTIAL ELEMENTS

BUSINESS COMPUTER PROGRAMMING I

75.87

(g) Business Computer Programming I (one, two, or three units) shall include the following essential elements:

- (1) concepts and skills related to general data processing. The student shall be provided opportunities to:
  - (A) demonstrate comprehension of data processing terms; and
  - (B) identify the major components of data processing system.
- (2) Concepts and skills related to hardware equipment utilization. The student shall be provided opportunities to:
  - (A) become familiar with operating computer hardware;
  - (B) categorize hardware according to size, application, and configuration; and
  - (C) demonstrate the ability to use basic operating systems.
- (3) Concepts and skills associated with programming. The student shall be provided opportunities to:
  - (A) demonstrate the skills related to algorithmic approaches to problem solving;
  - (B) demonstrate an understanding of computer language concepts;
  - (C) translate problems into logical steps using appropriate analytical analysis techniques;
  - (D) translate solutions to a common programming language; and
  - (E) demonstrate an understanding of preparation and uses of process documentation.
- (4) Concepts and skills associated with data storage. The student shall be provided opportunities to:
  - (A) demonstrate an understanding of the types of media for data storage;
  - (B) identify methods of storing data on storage devices;
  - (C) create and maintain a program to store and retrieve data from a file; and
  - (D) demonstrate knowledge of computer numbering systems and data representation on storage devices.

OFFICE EDUCATION ESSENTIAL ELEMENTS

BUSINESS COMPUTER PROGRAMMING II

75.87

(h) Business Computer Programming II (one, two, or three units) shall include the following essential elements:

(1) Concepts and skills related to application system development. The student shall be provided opportunities to:

(A) demonstrate a comprehension of the system development process;

(B) demonstrate a comprehension of the implementation process; and

(C) develop user documentation.

(2) Concepts and skills related to structured programming application. The student shall be provided opportunities to:

(A) develop an understanding of structured programming;

(B) identify the concepts of random and sequential files;

(C) translate solutions into major structural elements of a program;

(D) translate solutions into language statements for input, processing, and output; and

(E) develop ability to use an advanced operating system computer.

(3) Concepts and skills related to program testing. The student shall be provided opportunities to:

(A) develop test data and testing techniques;

(B) apply test data to programs run on the computer; and

(C) demonstrate the ability to debug and audit programs.

(4) Concepts and skills associated with software implementation and maintenance. The student shall be provided opportunities to:

(A) write documentation for maintaining a system;

(B) understand the process of implementing a system into production status; and

(C) develop an understanding of the programmer responsibilities in program maintenance.

OFFICE EDUCATION ESSENTIAL ELEMENTS

OFFICE SUPPORT SYSTEMS

75.87

(i) Office support systems (1/2 or one unit) shall include the following essential elements:

(1) Concepts and skills involved in keyboarding. The student shall be provided opportunities to:

(A) demonstrate the skill of keyboarding letters, memos, forms, and reports;

(B) apply appropriate procedures for proofreading and correcting errors; and

(C) demonstrate and identify information processing concepts in keyboarding.

(2) Concepts and skills necessary for filing. The student shall be provided opportunities to:

(A) demonstrate procedures used in alphabetic, numeric, subject, and geographic filing; and

(B) identify procedures used in electronic filing.

(3) Concepts and skills necessary for financial activities. The student shall be provided opportunities to:

(A) demonstrate the ability to maintain a checking account; and

(B) demonstrate the procedures involved in preparing a payroll and preparing tax reports.

(4) Concepts and skills necessary for processing mail. The student shall be provided opportunities to:

(A) identify the procedures involved in processing incoming and outgoing mail; and

(B) identify the procedures involved in transmitting mail electronically.

(5) Concepts and skills necessary for effective communications. The student shall be provided opportunities to:

(A) identify and use proper business techniques when using the telephone;

(B) prepare effective written communications; and

(C) identify and use proper language usage skills in business.

(6) Concepts and skills necessary for effective understanding of business operations. The student shall be provided opportunities to:

- (A) describe the role of business in the enterprise system; and
- (B) identify the general responsibilities of employees.

(7) Concepts and skills necessary for securing and maintaining employment. The student shall be provided opportunities to:

- (A) demonstrate the skills necessary for job application and interview; and
- (B) apply human relations skills and the ability to work with others.

MICROCOMPUTER APPLICATIONS

75.87

(j) Microcomputer applications (1/2 or one unit) shall include the following essential elements:

(1) Fundamental concepts and operational skills related to microcomputer systems. The student shall be provided opportunities to:

(A) understand the background and uses for computer systems;

(B) demonstrate competency in touch keyboarding, including technique, speed, and accuracy;

(C) understand the components of computer systems, including hardware, operating environments, and application software; and

(D) demonstrate competency in microcomputer systems operation.

(2) Concepts and skills necessary for microcomputer-based document production, formatting, and proofreading, at least including use of word processing software and automated spellchecking software. The student shall be provided opportunities to:

(A) identify and use the terminology related to word processing;

(B) demonstrate the operational procedures used in document production and page layout; and

(C) employ appropriate steps in producing documents.

(3) Concepts and skills necessary for use of microcomputer-based storage, retrieval, manipulation, and reporting information, at least including use of database management software. The student shall be provided opportunities to:

(A) identify and use the terminology related to information management;

(B) demonstrate the operational procedures and techniques used in information management software;

(C) use microcomputer software to design databases, enter and manipulate information, and produce reports (including graphic display of summary reports); and

(D) conduct keyword database searches using logic operations such as AND, OR, and NOT.

(4) Concepts and skills necessary for use of microcomputer-based computation, analysis, planning, and reporting with numeric data, at least including use of electronic spreadsheets. The student shall be provided opportunities to:

(A) identify and use the terminology related to electronic manipulation of numeric data;

(B) demonstrate operational procedures and techniques used with microcomputer software for processing numeric data;

(C) use microcomputer software for computation, analysis, planning, and reporting (including graphic display) with numeric data; and

(D) apply electronic spreadsheet software both through use of prepared templates and with student designed problem solutions.

(5) Concepts and skills related to emerging microcomputer-based information processing tools. The student shall be provided opportunities to:

(A) understand the concept of exchanging information via telecommunication software, at least including electronic mail, remote bulletin board access, and access of on-line information services;

(B) understand and use features of integrated software packages to share data among applications;

(C) understand concepts and identify characteristics and uses associated with tools for desktop publishing and generation of presentation graphics;

(D) understand concepts related to transporting of textual and nontextual data both locally and remotely, at least including transporting of text and facsimile images electronically, and physical transfer of ultra-high density storage media; and

(E) understand concepts related to networked and multi-user configurations.

(6) Concepts associated with the social implications of computers. The student shall be provided opportunities to:

(A) examine issues concerning responsible use of computer systems;

(B) understand the social ramifications of computer applications related to privacy, values, and reliability of systems; and

(C) understand the impact of computing on leisure and household management.

OFFICE EDUCATION ESSENTIAL ELEMENTS

BUSINESS FINANCIAL APPLICATIONS

75.87

(k) Business financial applications (1/2 or one unit) shall include the following essential elements:

- (1) Concepts and skills related to banking operations. The student shall be provided opportunities to:
  - (A) identify and understand checking accounts;
  - (B) understand fundamentals of teller operations; and
  - (D) identify and understand bookkeeping systems.
- (2) Concepts and skills related to credit administration. The student shall be provided opportunities to:
  - (A) understand methods of credit investigation; and
  - (B) understand concepts related to the use of credit analysis.
- (3) Concepts and skills related to loans. The student shall be provided opportunities to:
  - (A) identify types of loans and purposes; and
  - (B) demonstrate and understand calculation of interest and payoff.
- (4) Concepts and skills related to legal aspects of banking. The student shall be provided opportunities to:
  - (A) understand customer and consumer services; and
  - (B) understand regulations of financial intermediaries.
- (5) Concepts and skills related to other financial institutions. The student shall be provided opportunities to:
  - (A) understand and explore savings and loan operations; and
  - (B) understand and explore credit union operations.

APPENDIX D

SUGGESTED MINIMUM EQUIPMENT, FURNITURE, AND SUPPLIES LIST

(for a Quality Office Education program)

Equipment and furntiture:

- A computer or a terminal for each student
  - 640 K minimum storage
  - two disk drives
    - --at least one machine should be equipped with a disk drive to use the new 3 1/2 inch diskettes
  - hard disk 20 meg.
  - standard keyboard with keypad
  - high resolution graphics capability
  - several expansion slots
- Monitors
  - color if at all possible
  - high resolution at least EGA
  - swivel/tilt monitor bases
- Printers (A combination of the following printers may be needed in some programs)
  - A dot matrix printer for every two computers (programming classes)
    - graphics capabilities
    - 24 pin
    - near letter quality/high speed modes
  - Letter quality printers for every two computers (microcomputers/application classes)
  - Laser printer (preferably postscript)
- Other computer peripherals and equipment
  - Scanner (If you will be doing a lot of graphics work)
  - Automatic switch boxes for switching access to each computer/terminal attached
  - Mouse for each computer or terminal
  - At least two modems and access to dedicated phone line
  - Extra cables for attaching various peripherals

Copy machine

New overhead projector with low heat/good cooling system

LCD computer panel for data projection

Pull-down movie screen

File cabinets and storage cupboards

Adjustable copy stands

Adjustable student work stations at appropriate height

Adjustable chairs, preferably rolling

Supplies

- Covers and keyboard covers
- Sufficient number of diskettes for backups of each software programs for each computer
- Computer paper, both laser and regular cut
- Ribbons--standard black and colors
- Locking diskette cases
- Colored diskettes--each class uses a different color
- Computer maintenance kit--including screw drivers of various sizes, q-tips, alcohol, screen wipes, mini vacuum, air vacuum

APPENDIX E

ACKNOWLEDGEMENT

The module 7 Overview of the Vocational Special Needs Teachers Training Curriculum has been reprinted with permission as this appendix. Teachers are encouraged to refer to the original publication to learn more about working with special needs populations. The character font size and line spacing have been changed in this appendix to save space.

The project was developed in 1987 by Craig R. Colby, Ed.D. of Texas A&M University. Linda H. Parrish, Ph.D., Texas A&M University, and Jerry L. Wircenski, Ph.D., North Texas State University, were the project directors.

The vocational special needs teacher training curriculum was developed pursuant to a contract with the Texas Education Agency's Vocational Education Special Projects. Contractors or grantees undertaking such projects under Agency sponsorship are encouraged to freely express their professional judgement in the conduct of the project. Points of view or opinions stated do not, therefore, necessarily represent official Texas Education Agency position or policy.

This information is presented as an appendix to help Office Education teachers with planning the modification of instruction for special populations. Many of the concepts and ideas presented are sound practices to be used with normal populations.

The entire 10 module training curriculum is available through the Extension, Instruction and Materials Center, University of Texas at Austin, P.O. Box 7218, Austin, Texas 78713-7218.

Some examples have been modified to meet the needs of Office Education programs.

CURRICULUM MODIFICATION

The term "vocational curriculum" can be defined as the organized content of a particular discipline which a student must master to attain an occupational goal. It involves the sum total of all experiences and learning activities encountered in the classroom. A curriculum is concerned with results. It encompasses "what is to be taught" and "what is to be learned" (Stern-Otazo, 1980; Goh & Sitlington, 1983).

As discussed in previous modules, each student has a mental capacity, physical skills, and various needs which vary from one individual to the other. In addition, students exhibit different learning styles. All good teachers recognize this and will work toward developing a classroom environment which is characterized by a deep respect for the learner, acceptance of student, fulfillment of individual needs, and individual development. This is what is meant by the teacher who has become "learner-centered" and not "content-centered" (Pine & Boy, 1977). Jones (1977) eloquently describes recognizing individual worth and individual development as being the basis for curriculum development as follows:

> **Individual development** as a basis for curriculum perspective would lead us to teach discovery of principles and sacredness of the individual personality. It would teach the learners to view themselves as self-actualizing individuals in a setting designed to support and encourage personal development to the ultimate of one's potential. Attempts to improve the local community would center around providing a richer and fuller life for personal growth and development. Good people make good communities, good states, good nations, and good world. By emphasizing development of individuals, such a curriculum would hope to plant the seed for a better world in the future.

Therefore, all learners should be perceived as a very "special" individuals who one day will take their place in society. It is the responsibility of educators to assist **all** learners (in spite of their shortcomings) to become productive members of society. This can be accomplished by helping each student establish attainable career goals and then providing meaningful experiences through which the student can achieve these goals. Every student should be treated with dignity, as an individual who has unique strengths and interests in life. It is not necessary or even realistic to expect every student to do and know all the same things. As stated by Jones (1977), "Learners should become worthwhile persons in their own right,...it is not necessary that they all become miniature images of the same pattern."

Purpose of Curriculum Modification

When working with students with special needs, a learner's curriculum may need to be modified or adjusted to take into account major differences which could be found among these individuals. The term "curriculum modification" can be defined as tailoring an existing curriculum to the unique needs of students as they pursue an occupational goal (Sarkees & Scott, 1985; Goh & Sitlington, 1983). However, it should be strongly emphasized that modifying a curriculum does not mean that an educator should lower or alter the standards of his or her program. What it does mean is that the Admission Review and Dismissal (ARD) Committee (for handicapped students) or coordinated planning team (for disadvantaged and LEP students) determines which essential elements in the regular school curriculum would be appropriate for a student's needs. The State Board Of Education Rules For Curriculum offers the following key points (Texas Education Agency, 1985):

1. For students with special needs, school districts shall provide modifications in methodologies, pacing, and materials to ensure that instruction is delivered, as appropriate, in the essential elements.

2. Students with special needs shall be instructed in those same essential elements in a manner appropriate to their needs.

3. School districts shall implement the provisions (under Chapter 75) in a manner which will enable all students to participate actively in a well-balanced curriculum and master, to the best of their abilities, the knowledge, skills, and competencies established through the essential elements.

4. Specialized personnel and regular program personnel shall be jointly responsible for the cooperative delivery of effective instruction in the essential elements, as appropriate.

It is important to re-emphasize that special needs students, as all students, have capabilities which widely vary. The challenge parents, educators, and vocational counselors face is to help each learner reach occupational goals which are within the student's potential.

The Curriculum Modification Process

In developing a meaningful and challenging vocational curriculum for a special needs learner, the ARD Committee or coordinated planning team should carefully review the student's vocational assessment information which consists of: (a) the student's capabilities, (b) parent and student interviews (including the career expectations of the learner), (c) the student's vocational interests and abilities, and (d) the teacher's informal behavioral assessments of the student.

After reviewing this information, the planning team can then work toward developing realistic and appropriate vocational goals for the student. Important items to consider when developing vocational goals include: (a) community employment needs, (b) vocational readiness skills, (c) multiple exit points (jobs that a learner can prepare for in the vocational program), and (d) entry-level competencies expected by employers for each of the exit points. In this way, the learner would be aware of realistic employment opportunities, specific skills needed for entry into a vocational program, and specific objectives which must be fulfilled in reaching an employment goal.

A number of special education curriculum models have been designed which take into account both the needs of a vocational program and the needs of the learner. The basic components which many of the designs have in common are as follows:

1. The importance of working with existing vocational curricula.

2. The importance of building upon the student's interests and competencies.

3. The identification of long range vocational goals and short range objectives--which are stated in measurable terms.

For the purpose of this overview, the competency-based curriculum modification model has been selected for discussion.

The Competency-Based Curriculum

Over the years, the concept of competency-based curriculum has increased in popularity largely due to the emphasis on accountability in education (Choate, et al., 1987). In addition, since the passage of P.L. 94-142, vocational educators have had to adjust their curricula to take into account the capabilities of special needs learners.

The underlaying principle behind the competency-based curriculum is to assist the student in becoming a more effective person. This entails helping the student develop skills or competencies which will promote employment opportunities and a higher self-esteem within the student (Brolin, 1976; Lippmann & Porter, 1976). The ability to succeed is what makes competency-based learning so valuable for students with special needs (Kok, 1978). With competency-based learning a student does not have to wait until the end of the program to experience success. The sequential steps called for throughout the program afford the possibility of success on a day-to-day basis (Lippmann & Porter, 1976).

The concept of competency-based learning is relatively simple. Based upon the learner's assessment information, the educator establishes specific goals (competencies) which will help the student "function adequately as a consumer, a producer, a learner, and a citizen" (Parnell, 1973). For example, in an auto mechanics class, the student's occupational program goals or competencies may include one or more of the following: (a) performing a simple lubrication, (b) repairing a tire, (c) changing the battery, (d) completing an engine tune-up, (e) completing a valve job, (f) fixing the carburetor, or (g) overhauling the engine. Next, the educator develops objectives and an individualized instructional plan for the student to follow. This individualized instructional plan includes: (a) an objective, (b) an introduction, (c) a learning activity, (d) a test/checklist, and (e) answers/feedbacks.

Therefore, in competency-based learning it is not necessary or even realistic for the instructor to expose every learner to all the aspects of a vocational program. Competency-based learning focuses on the quality of learning rather than the quantity of learning such that the student who has limited skills could still find employment (Kok, 1978).

Gills's Four-Step Model

An excellent competency-based paradigm or model which can be utilized by vocational educators to maximize a learner's vocational potential was developed by Douglas H. Gill (Sarkees & Scott, 1982). The design of Gill's model involves the use of four sequential steps and utilizes the regular vocational curriculum as a basis for the modification process.

Step one. The first step in Gill's model requires the educator to gain a clear picture of the existing curriculum any student would follow in a particular vocational program. Gill calls this step "Establishing the Curriculum Framework." The purpose of this step is to organize the existing curriculum in such a way that it can be modified. This step involves: (a) identifying the overall long range goals of the vocational program, (b) identifying and listing the short-term objectives that sequentially comprise each long-range goal, and (c) identifying the instructional units which comprise a sequence for attaining each short-term objective. An example of a curriculum framework which outlines an overall long range goal, short-term objective, and instructional units follows:

1. **Long range goal**: Given appropriate tools, equipment and materials, the student will be able to demonstrate instructor specified job entry level skills in office occupations at a comparable rate of time and accuracy to that found on the job.

2. **Short term objective**: The student will be able to demonstrate the basic skills of data entry.

3. **Instructional units**: Word Processing. Using Data Base. Using Spreadsheets.

Once the long range goals, short term objectives, and instructional units have been outlined for a particular vocational program, the educator can begin the work of modification for a special needs learner.

Step two. Step two of Gill's four-step model, "Developing an Instructional Task Analysis," builds upon step one. The instructional task analysis lists the tasks that, when sequenced, make up the instructional unit. In this step the educator identifies the required tasks the student must perform, emphasizing what the student must do rather than what the student must read or write. An example of instructional tasks for one of the instructional units above follows:

1. **Instructional unit**: Word Processing

2. **Instructional tasks**:
    - Operates standard keyboards
    - Gains access to system
    - Terminates operations
    - Operates keyboard functions keys
    - Operates visual display stations
    - Operates optical character recognition equipment (OCR)
    - Develops user-defined program sequences
    - Implements program sequence
    - Uses new hardware and software features
    - Operates storage function controls
    - Uses floppy disks to store, retrieve and/or duplicate information
    - Uses fixed disk to store, retrieve and/or duplicate information
    - Uses magnetic tapes to store, retrieve and/or duplicate information
    - Initializes disks
    - Deletes information from storage
    - Handles and stores media
    - Operates output device function controls
    - Operates paper handling devices
    - Uses impact printers
    - Uses laser printers
    - Uses telecommunication features
    - Performs operator maintenance
    - Determines sources of malfunctions
    - Corrects or reports malfunctions

Therefore, establishing the curriculum framework and required instructional tasks (task analysis) organizes the instructional process and prepares for the next step in the process.

Step three. The third step in Gill's four-step model represents the implementation stage. This step, "Developing the Curriculum Supplement," involves developing usable supplements for the existing curriculum. The curriculum supplement is designed to be used jointly by the instructor and the resource support person. The curriculum supplement is composed of two major parts: (a) the Learning Plan and (b) the Supplemental Learning Plan.

The Learning Plan is used primarily by the instructor and consists of the following four basic parts:

1. Instructional unit
2. Instructional task
3. Performance-based task activities
4. Performance-based task check

The instructional unit and instructional task are components of the curriculum framework. The performance-based task activities describe for the instructor those task elements the student will do. The performance-based task check is a measurement of the student's ability to master the task at hand.

The Supplemental Learning Plan was developed for use primarily by special needs support personnel and consists of the following six basic parts:

1. Instructional unit
2. Instructional task
3. Task terminology
4. Essential math operations
5. Coordinated movements
6. Related concepts

The purpose of the Supplemental Learning Plan is to identify basic knowledge (task terminology, essential math operations, important concepts) and prerequisite skills (coordinated movements, related concepts) the learner must posses in order to complete an instructional task. The Supplemental Learning Plan can be very useful in helping the resource teacher and instructor identify those areas where instruction support may be needed. It is, therefore, very important that the Learning Plan and Supplemental Learning Plan be developed by the instructor, special education teacher, or support/resource teacher for each instructional task. In this way, if a learner has difficulty mastering a specific task, individualized activities can be developed by selected individuals to help the student resolve the problem.

Step four. The fourth and final step of Gill's model is the development of an individualized student module. The student's module is created from the Learning Plan and Supplemental Learning Plan and is the culmination of the curriculum modification process. The student's module consists of the following four components (Goh & Sitlington, 1983):

1. **Word section:** Includes terms identified on the supplemental learning plan, along with definitions of each term.
2. **Job tasks:** Definition of each step in the job. This appears in the student module under the heading "What You Do."
3. **Illustrations of job tasks:** The illustrations help clarify the job steps and should be clear and precise, without being complex.
4. **Evaluation procedures:** Both enroute (formative) checkups and a final (summative) performance check are included to assess the learner's progress through the module.

The student's module is tailored to help meet the specific needs of a learner and serves as a guide to assist the student in achieving instructional tasks. Various ways in which a student's module can be individualized to take into account the various learner differences found in the training setting are as follows (Goh & Sitlington, 1983):

1. The amount of detail and illustrations can be varied to take into account learner differences in intellectual abilities and educational backgrounds.
2. The mode of presentation can be altered to meet the needs of learners with differences in learning styles (e.g. audio-cassettes can be added for auditory learners).
3. The amount of feedback from the module and instructor can be increased or decreased to match differences in motivation, perseverance, and tolerance levels.

In summary, Gill's four-step model is a competency-based process flowing directly from the regular vocational curriculum. The steps range from establishing a curriculum framework to developing an individualized student module. Gill's model is not designed to replace or lower the standards of the regular vocational curriculum. It is a systematic process by which a special needs student can achieve solid vocational goals through the cooperative support of vocational instructors, special educators, and support personnel.

Responsibilities of the Vocational Educator

The primary responsibility of the vocational educator in the curriculum modification process is to help the special needs student establish and reach realistic occupational goals. In an effort to accomplish this, the vocational educator must identify the following (Sarkees & Scott, 1985):

1. Pertinent information about what will be taught in a vocational program.
2. Necessary requirements for program completion.
3. Multiple exit points (jobs that the learner can prepare for in a vocational program).

4. Entry level competencies expected by employers for each of the exit points.

It is also the responsibility of every vocational educator to establish an effective and wholesome learning environment for their students. Providing this environment may involve modifying the vocational facility, equipment, tools and/or instruction. This information will be provided in the following section.

MODIFICATION OF THE LEARNING ENVIRONMENT

The term "learning environment" refers to both the physical and instructional setting of the vocational classroom/laboratory (Bell, 1984). It is the responsibility of each vocational educator to work at developing a learning environment which will contribute to the overall well-being and success of every student. The key factors found in a wholesome learning environment are those which promote:

1. **Safety, organization, and physical comfort.** In the vocational laboratory, it is absolutely crucial that each student abide by safety rules set by the instructor. In addition, the laboratory should be kept well organized and clean. A laboratory which is safe, well organized, and physically comfortable helps promote high morale and good work habits.

2. **Respect and acceptance**. Within an effective learning environment, students will show respect not only for the instructor but for each other as well. The instructor should be the student's best role model. The care and acceptance given by the instructor to each student (disabled or non-disabled) will go a long way in promoting peer acceptance, a positive attitude, and healthy self-esteem.

3. **Discipline.** A wholesome learning environment is one which promotes discipline and a positive self-concept within each student. Inappropriate behavior has the potential to seriously affect classroom safety, morale, and the overall learning process. Ways in which the instructor can help the student modify inappropriate behavior include: (a) utilizing the time-out technique, (b) developing student-teacher contracts, (c) ignoring negative behavior--whenever possible, and (d) rewarding appropriate behavior with approval and praise.

4. **Flexibility**. An effective learning environment is flexible and can adapt to a special student's unique needs (i.e., slower rate of learning, inability to access regular tools/equipment, or remedial needs in reading or math for instance). A flexible environment fosters individualized programs through which a special learner can develop marketable skills for employment.

Modifying Facilities, Equipment, and Tools

In the past, many special needs learners have been denied their basic right to a public education because of architectural barriers, nonadaptive facilities, equipment, and tools (Phelps & Lutz, 1977). However, federal legislation has done a great deal to provide equal access to educational programs for every learner. For example, according to Section 503 of the Rehabilitation Act of 1973, each federally funded program or activity in which a handicapped individual can enroll and profit must be made accessible to the student (Sarkees & Scott, 1985). In addition, the Carl Perkins Act of 1984 has emphasized the importance of providing supplemental services for special needs learners, which include the adaptation of facilities, equipment, curriculum, and instruction (Cobb & Kingburgy, 1985).

Modifying facilities. A barrier-free facility planned for safety, efficiency, and convenience is of vital importance to individuals with special needs--especially those who are in wheelchairs, on crutches, or have artificial limbs. According to Sarkees & Scott (1985), three major areas in which architectural barriers may be present at most vocational education facilities are:

1. **Getting to and entering the building** -- getting to the ground from public or private transportation; parking; negotiating parking lot pavement, curbs, walkways, ramps, and stairways; and entering exterior doors.

2. **Moving about inside a building** -- moving through corridors and hallways; moving from floor to floor; identifying and entering classrooms, laboratories, and auxiliary areas; moving through aisles and traffic lanes inside classrooms and laboratories.

3. **Using school fixtures, appliances, and study/work station area equipment** -- using restrooms, drinking fountains, vending machines, tools, machines, and work station apparatus.

In an effort to eliminate these barriers, vocational educators, planners, and administrators should contact the State Architectural Barriers Board or State Department of Education regarding the guidelines and standards that have been developed for compliance with federal mandates. The federal government has adopted the American National Standards Institute (ANSI) accessibility standards as its mandatory guidelines for removal of architectural barriers (Sarkees & Scott, 1985).

Modifying equipment and tools. Based upon the needs of each special learner, it may become necessary to modify existing equipment and tools to accommodate the special needs student. The degree of modification will depend upon the type and extent of each student's impairment. It should be remembered, however, that equipment should be modified only to the extent necessary to assist the student. Whenever possible, as the student generates competence in a learning task, the modified equipment should be replaced with regular equipment (Phelps & Lutz, 1977). The following are some general suggestions in which equipment and tools can be modified for specific classifications of special needs students (Phelps & Lutz, 1977; Sarkees & Scott, 1985; Stern & Gathercoal, 1986):

Important Note: It is very possible that a number of these suggestions could apply to more than one category.
Furthermore, some of these modifications may be applicable to disadvantaged and LEP students. This, of course, would depend upon the needs of the particular student.

Modifications for Orthopedically-Impaired Students

1. Work benches can be cut out so that wheelchair bound students can pull up close to the work surface.

2. Modify the height of workbenches, storage cabinets, table tops, etc. to make them accessible to wheelchair bound students.

3. A lap board can be fitted on the arms of the wheel chair to provide a work area.

4. Rearrange storage areas for tools and supplies to make them accessible and as near to the work station as possible.

5. Position bench-mounted power tools on the ends of benches.

6. Semistationary equipment should be put on variable height bases.

7. Modify machine controls so that they can be operated with prostheses such as an arm hook.

8. Replace cabinet knobs with levers or handles.

9. Convert knob-type ON-OFF switches to toggle switches, levers, or slide-adjustment mechanisms.

10. Provide an aid that increases mechanical advantage in manipulating controls.

11. Convert machines and equipment that have hand controls to the foot pedal type for students who have upper extremity disabilities.

12. Select machines that do not require two-handed operation, such as a radial arm saw instead of a table saw.

13. Place small parts of instruments on a foam pad to aid students in picking them up.

14. Select tools that require only one hand to operate, such as split screwdrivers, which hold screws and bolts for starting.

15. Provide holding devices such as vacuum vises, stationary vises, clamps, jibs, and fixtures that permit one-handed operation.

16. Provide tools that supply more mechanical advantage to loosen or tighten screws or bolts, such as a lever-type socket set or an offset screwdriver.

17. For students who have weak hands, increase the size of tool handles by replacing them with larger diameter handles or by enlarging them with tubing or tape wrappings.

18. Provide templates to aid drafting students who have trouble manipulating standard drafting instruments.

Modifications for Hearing-Impaired Students

1. Install a red light next to the on-off switch so that the student can tell when the machine is in operation.

2. Install amplification devices on auditory warning signals so that they can be heard by those with partial hearing.

3. Use visual timers in place of those that emit sounds.

Modifications for Visually-Impaired Students

1. Purchase commercially available measuring tools with raised or engraved markings that can be read by touch.
2. Purchase measuring devices that provide auditory signals.
3. Brailled tape or raised marks can be used on control dials and switches.
4. Enlarge markings on tools, tool holders, or machine controls.
5. Provide jigs, guides, and templates to aid students in positioning and guiding tools.
6. Identify controls by changing their size, shape, or texture.

Modifications for Mentally-Impaired Students.

1. Color code important parts of machines or equipment.
2. Devise jigs, fixtures, templates, and guides to simplify work task operations.

Modifications for Limited English Proficient Students

1. Utilize name placards (Spanish and English) for machines, tools, and equipment.
2. Color code or use symbols for dangerous machines. For example, one red dot could indicate a dangerous machine and two red dots could indicate a very dangerous machine.

A wide variety of specially designed aids, tools, machines, and equipment are commercially available to assist the special needs learner. Occasionally, this material can be paid for through vocational rehabilitation centers or the school's special education program. Information pertaining to manufactured devices can be found in school supply catalogs or in catalogs published by special institutes. A very comprehensive resource has been developed by the Wisconsin Studies Center, University of Wisconsin-Madison, entitled Tools, Equipment and Machinery Adapted for the Vocational Education and Employment of Handicapped People. In addition, information is available through the school's special education personnel and vocational rehabilitation counselors (Sarkees & Scott, 1985).

In conclusion, two educational topics have been presented which are **fundamental components** to the successful instruction of learners with special needs: (a) developing or tailoring an appropriate curriculum and (b) establishing a favorable learning environment. Within the final section of this Overview, basic principles will be presented which will address the actual instruction of special learners.

MODIFICATION OF INSTRUCTION

The primary purpose of this section is to provide the vocational educator with teaching strategies and techniques that will be useful when instructing students with special needs. It is important to remember that the methods and approaches used by educators when instructing non-special needs students may not be very effective with students with special needs (Gleiss-Monar & Sitlington, 1983). Therefore, individualizing instruction becomes vitally important in the successful instruction of special learners.

Within this section, the following topics will be discussed: (a) learning styles, (b) teaching strategies, (c) remediation techniques, and (d) Brown's 3-Cs Instructional Mode.

Learning Styles

Each special learner has unique needs and these needs affect how the student can best learn. For example, if a student is blind or has difficulty with "visual" learning, the instructor should stress the learner's sense of sight. Therefore, the manner in which a student with special needs learns ceases to be a preference, but becomes instead a necessity (Kok, Jernigan, & Hull, 1978). Further, one of the main philosophies behind individual learning styles is that learning should be a pleasant and successful experience. Educators, therefore, should adjust their style of teaching to allow students the benefit of learning in their preferred manner (Kok, Jernigan, & Hull, 1978).

Identifying a student's learning style.

The following are methods in which an educator can identify a student's learning style:

1. **Informal observation.** One of the simplest and possibly best ways to identify a student's learning style is through informal observation. By observing the student as he or she negotiates classroom/laboratory learning activities, the educator can collect valuable information with regard to the student's learning style. For example, the educator may observe that a disadvantaged student answers questions in class and does well with hands-on activities but repeatedly fails written exams. If the primary intent of the instruction is to reach vocational skills rather than reading and writing skills, the instructor could modify their style of teaching by allowing the student to take oral and/or hands-on exams (Kok, Jernigan, & Hull, 1978: Sarkees & Scott, 1985).

2. **Teacher consultation.** Consulting other teachers (i.e., special education teachers, resource room teachers, support personnel, paraprofessionals, and other vocational education teachers) can be an excellent source for information regarding a student's learning style (Sarkees & Scott, 1985).

3. **Student/parent interviews.** Interviewing the student and student's parents/guardians can result in valuable insights as to the student's best learning modes (Sarkees & Scott, 1985)

4. **Standardized inventories.** Standardized inventories provide an alternative for students who are shy or uncomfortable during a personal interview. Information received from interest, personality, and learning style inventories can provide valuable information with regard to the student's learning style (Kok, Jernigan, & Hull, 1978; Sarkees & Scott, 1985).

Teaching Strategies

Once the student's vocational goals, learning capability, and preferred learning style have been identified, the educator can begin to experiment with a variety of teaching techniques and instructional materials. When determining the teaching technique and instructional material best suited to meet a student's unique needs, it is important for the educator to be patient, open-minded, and flexible. Not every instructional technique and/or material can be used successfully with each learner (Sarkees & Scott, 1985). In addition, the educator should not hesitate to enlist the support of other instructors, school counselors, student aides, paraprofessionals, volunteers from the community, itinerant teachers, and/or interpreters. This pooling of efforts can result in increased student learning because of the variety of approaches and personal attention which can be brought to the classroom or laboratory (Harrington & Fardig, 1982).

The following are general guidelines and instructional techniques which an educator can use to help meet a special needs learner's unique needs and learning style:

1. **Orientation**. Students with special needs may need additional orientation with regard to: (a) the relevancy of their individualized goals, (b) class procedures, (c) safety, etc.

2. **Flexible pacing**. Students with special needs can exhibit different rates of learning. The educator should provide flexibility in pacing of instruction and assignments to meet the various needs of learners. In general, students with special needs should be individually paced to maintain their progress and interest, yet avoid the frustrations and failure undue pressure may cause (Harrington & Fardig, 1982; Sarkees & Scott, 1985).

3. **Demonstration.** Utilization of the demonstration method can be very effective in introducing a new skill to a learner with special needs.

4. **Breaking material into small distinct steps**. As a general rule, it is important for the educator to break a learning concept into small distinct steps. In this way, the educator can best identify where the student is experiencing difficulty.

5. **Positive environment and feedback**. In general, students with special needs lack confidence and a positive self-concept. This is primarily due to their not having had much success in life. In addition, the few successes special learners do have usually result in little, if any, positive reinforcement (i.e., praise, reward, and/or encouragement). Therefore, it is incumbent upon educators to create a positive, nonthreatening learning-environment for their students and to make generous use of positive feedback when the student experiences success. Constructive criticism should not be avoided; however, it should be given in a positive manner (i.e, students should understand that their behavior or product is what's being criticized and not their worth as a human being). Finally, all students must learn that mistakes and constructive criticism are a normal and expected part of life (Harrington & Fardig, 1982).

6. **Use of peer tutors, college students, and volunteers**. Use of peer tutors, college students, and volunteers can greatly assist a vocational educator's work with special learners by: (a) helping with individualized instruction, (b) providing positive role models, (c) increasing student participation, (d) increasing the special learner's success experiences, (e) increasing the student's confidence

and self-esteem, and (f) improving the special learner's social and academic skills (Asselin & Anderson, 1986). In addition, peer tutors, college students, and volunteers can receive teaching experience and the satisfaction of helping individuals with special needs progress.

7. **Flexible grouping**. The educator can integrate special needs learners into groups of various sizes (according to the student's goals, interests, or ability level) and utilize peer tutors, college students, and volunteers for assistance. According to Sarkees & Scott, grouping students has the following advantages: (a) it allows the teacher more time to work among the students, (b) it allows the teacher to individualize instruction, tasks, and assignments to meet the needs of students in a specific group, (c) it provides special needs learners with an opportunity to work with peers and establish positive interpersonal and working relationships with them, (d) it serves as a motivating factor for special needs learners because the individualized nature of the group work does not become threatening or frustrating but allows students an opportunity to work at their own pace through their strongest learning style, (e) it allows teachers to arrange for instruction for the entire class, small group discussions, project groups, and small remedial sessions so that instruction will be diversified and more meaningful for all students; and (f) it allows the teacher to modify the task or assignment for a small group of students with specific needs, as in the case of learners who have a physical disability (Sarkees & Scott, 1985).

8. **Providing field trips and job site visits**. Scheduled field trips and job site visits can give all learners a realistic first-hand look into the real world of work. By "shadowing" workers in a particular occupational area, students can gain helpful insights into their own career decision. In addition, a field trip or job site visit can be very motivational in that the student can readily observe how his/her vocational training will be used in the world of work (Sarkees & Scott, 1985).

9. **Use of media**. Utilizing media can embellish instruction by: (a) assisting the teacher in presenting the proficiency or skill requirements for a specific job, (b) reinforcing concepts presented in a classroom, laboratory, or demonstration activity, (c) providing a vehicle for special needs learners to show what they have learned, (d) providing a valuable source of remedial assistance, (e) providing simulated learning experiences, (f) allowing special needs students to learn through their strongest style, and (g) adding variety to the instructional program. Examples of media include: computer assisted instruction (CAI), 16 mm films, film strips, flip charts, overhead transparencies, tape recorders, records, posters, magazines, and diagrams (Sarkees & Scott, 1985).

10. **Use of student-teacher contracts**. Student-teacher contracts can be excellent tools in helping learners with special needs achieve their vocational goals. The following guidelines should be used in developing and implementing a student-teacher contract: (a) decide on the task or project, (b) specifically state the requirements, (c) determine the minimum acceptable accuracy, (d) set a time limit--initially, short assignments and short time periods are usually best, (e) identify consequences, (f) discuss contract with student and support personnel, (g) have all parties sign the contract, (h) positive reinforcement should be given if the terms of the contract are satisfactorily met, (i) uncompleted contracts should be analyzed by the teacher and student to determine the causes, and (j) develop new contracts cooperatively (Sarkees & Scott, 1985).

The following is a list of specific teaching strategies which educators can utilize when addressing the unique needs of handicapped students (Sarkees & Scott, 1985; Stern & Gathercoal, 1986; Tindall; 1980):

Important Note: It is very important to note that many of these teaching strategies could be used for all students. Appearing later in this Overview is a listing of instruction strategies which could be generic to all special needs students.

Instructing Students Who Are Mentally-Impaired

Involve as many different senses as possible in the learning process.

Use concrete specific terms rather than abstract terms. If necessary, have the student repeat the necessary information to you.

When giving written directions use lists instead of paragraphs. With regard to the student who can barely read, contact the remedial reading staff and arrange reading instruction. This instruction should focus on required reading for your course and that which is vital for employment.

Teach by demonstration (whenever possible). Don't hesitate to use hand-over-hand assistance in demonstrating how to use a tool or machine.

Allow time to practice machine or tool processes.

Break down complex operations into smaller tasks.

With regard to feedback, let the learner know what is wanted, and whether or not the student is achieving it. Give lots of positive reinforcement and encouragement. Nonverbal feedback is also helpful (i.e. touching the student or task, pointing, blocking or stopping an error as it is developing, and guiding the learner's movements). In addition, provide specific feedback with regard to the student's work. For example, the educator should say, "This piece was cut exactly to the right size," or "You put these two parts together correctly, " or use Mark Gold's expression "Try another way" (Gold, 1975).

Build the student's confidence by: (a) utilizing activities that will assure success, (b) assigning special tasks which will communicate with the educator's confidence in the student, (c) giving students an opportunity to correct their work and hand in a good project or assignment, and (d) displaying the student's good work.

In helping students with their ability to make correct discriminations, utilize Gold's "match to sample" technique in which the student is provided an example and a number of choices. The student will choose the correct alternative based upon the characteristics of the sample (Gold & Scott, 1971).

With regard to helping the student make correct discriminations when there are minimal differences between the stimuli, it may be necessary to: (a) present the choices in an easy form at first, (b) exaggerate attributes, (c) make the choices gradually harder, or (d) add and fade out color cue, add and then gradually remove large cue differences, or combine these two approaches.

Retention/memory can be improved by: (a) being systematic and presenting one new piece of learning at a time, (b) relating new material to familiar material, and keeping it practical and concrete, and (c) utilizing training techniques such as the total task method, chaining, modeling/demonstrating, and the structured overview (see Tindalls' Puzzled About Educating Special Needs Students).

"Generalizing", or having the student apply what has been learned to the contexts, can be improved by: (a) using examples from different relevant contexts and (b) practicing in settings similar to or exactly like those that will be encountered on the job.

Instructing Students Who Are Hearing-Impaired

In private, discuss with the student his/her ability to communicate with you (lip/speech reading, use of hearing aid, writing, signing, and total communication). An open discussion with the student which demonstrates your concern as an educator is an excellent beginning in building rapport.

Body language communicates messages too. Remember not to give mixed messages with your body language. Also, be alert to the body message the student is giving you (i.e., is he/she communicating tension, nervousness, avoidance, or confusion?)

If you will be working with an interpreter, do not instruct the deaf student as if he/she were a third party. Speak directly to the student. Also, remember that the interpreter is ethically bound to interpret everything you say. Therefore, sensitive or other issues concerning the student is best addressed in a meeting before or after class. If you are using media where the room must be darkened, focus a small lamp on the interpreter.

Maintain good eye contact with the student while speaking.

Speak slowly and clearly, pronouncing each word, but without exaggerating or over pronouncing.

Do not stand in front of a window while speaking. The light should be shining on your face and not the student's.

Try to rephrase a thought rather than saying the same words over again.

Encourage the student to read ahead on class material.

Try to keep the noise level down as much as possible in the class/laboratory.

Utilize handouts, the chalkboard, and other media.

Install a light to indicate when dangerous machinery is on.

Instructing Students Who Are Speech-Impaired

Always maintain eye contact and nod your head while the student is talking. This will help the student build confidence.

Work cooperatively with speech therapist and/or communication specialist to determine which technique will help most in assisting these students to communicate more effectively.

Encourage peer tutoring and small group activities to help the speech-impaired student develop interpersonal relationships with the other students.

Always allow sufficient time for the student to complete his/her sentence.

Try not to act uncomfortable when these individuals are communicating with you (i.e., discontinuing eye contact, shifting your position, clearing your throat). Your discomfort can be very discouraging to the student.

Do not require these individuals to present oral reports until they feel comfortable in the classroom environment.

Model correct sentence structure for the speech-impaired student so he/she can follow your example.

Develop a list of technical terms used in your class and share these terms with the speech specialist to help the student become more confident n pronouncing terms used in class.

Instructing Students Who are Visually-Impaired

Orient the student to the classroom or laboratory before the course begins. Consistency and orderliness in the physical environment is very important to the visually-impaired student.

Arrange seating so the blind student will be able to hear the instruction and to allow for the best distance and lighting conditions for the partially sighted student.

Provide as many opportunities as possible for the visually impaired student to observe closely or to touch the materials.

Give materials and handouts to the student ahead of time. Also, a student peer can assist the visually-impaired student by making a carbon copy or a photocopy of their notes. Also, when possible, the educator can make a copy of their teaching notes. In this way, the visually-impaired student can review the materials with a tutor or have them transcribed into braille or taped.

It is important to gain and maintain the student's attention. Approval or disapproval will need to be verbalized.

Remember there is no need to talk louder to a visually-impaired student.

Rehabilitation counselors or special needs teachers can be useful resources in helping the student use commercial or modified learning aids or tools.

Tests may need to be prepared in large print, braille, on cassette tapes, or converted into exercises using the sense of touch. Also, it may be necessary to allow the student extra time to complete the test.

The tape recorder is the most frequently used technique for notetaking and preparing modified learning materials for the visually-impaired student.

The following is a sample of specially designed machines now available for the visually-impaired student: (a) OPTACON (Optical to Tacile Converter) allows students to read printed material, (b) STEREOTONER is similar to the OPTACON but converts the printed word into a tone pattern, (c) OPTOPHONE and VISOTACTOR convert print into sound, and (d) KURZWEL READING MACHINE which converts standard English text on a computer into easily comprehended speech.

A number of general tools or aids which can assist the student in reading or writing lessons for vocational courses follow: (a) braille, (b) large print, (c) tape recorders, (d) talking books, (e) raised letters, (f) slate and stylus (used to make notes), (g) braille writer (a 6-key manually operated machine), (h) typewriters, (i) braille verifier (types braille and regular copy simultaneously), and (j) signature guides.

Aids for mathematics and computer programming courses follow: (a) abacus design for the blind, (b) raised clock faces, (c) wire geometrical forms, (d) braille rulers, (e) raised-line checkbooks, (f) raised-line boards, (g) braille dominoes, (h) braille flash cards, (i) cubes with raised braille dots used for simple mathematical problems, (j) raised-line paper or graphs, (k) computer terminals that use braille printers, or those that type braille and conventional type simultaneously, and (l) talking calculators.

Aids used frequently in other vocational courses include: (a) braille maps, charts, diagrams, (b) self-threading needles, (c) wooden or cardboard models of specimens that other students see through microscopes, (d) braille micrometers and other shop tools that have special raised markings, (e) braille demo tapes to mark lab equipment and models, (f) light probes with audible sounds that check the operating status of machines, and (g) guides or templates to help students align objects properly.

Instructing Students Who Are Seriously Emotionally Disturbed

Consult with the student's parents, special education teacher, or counselor to determine whether any particular teaching techniques will help or hinder learning.

Try to understand the student. Disturbing behaviors are the outward sign of inner turmoil.

Go easy on bad days and avoid direct confrontations that would aggravate the situation.

Communicate acceptance to the student and a willingness to help him or her succeed in class.

Provide immediate feedback and reinforcement.

Establishing a rapport and trust with the student is important.

In the beginning of the semester, help the student gain confidence by giving him or her lessons in which success can be achieved in a series of small steps.

A measure of privacy when the student attempts a new task can ease his or her embarrassment at any awkwardness or ineptness.

Allow the student to correct mistakes prior to turning in an assignment or project to ease any pressure.

Help the student not to overreact to failure and praise him or her for continuing to try.

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Cue appropriate behavior in a quiet, unemotional manner.

In resolving discipline problems: (a) do so in privacy, (b) focus on objective facts in a calm, supportive tone, (c) actively listen to the student, (d) after listening to the student, reflect on what has been said, by telling the student what you've heard, (e) ask the student if he or she has any ideas about solving the problem (encourage the student to be specific), and (f) conclude with a clear understanding of the changes, timeframe, and benefits which are expected.

In handling aggressive behavior: (a) try to remain calm and model the controlled behavior which you desire, (b) intervene by either separating the individuals involved and having them work on another activity or having them take a time-out in separate corners of the room, (c) if necessary, send an uninvolved student to the office to get help, either in talking to the students or in managing the class while the teacher talks to them, and (d) return to normal classroom procedure as quickly as possible.

Access professional collegues in special education evaluation, counselling, or therapy when the student's behavior appears to be in need of additional attention.

Instructing Students Who Are Orthopedically-Impaired

In general, students with physical handicaps will be intellectually capable and able to participate in vocational programs.

Make the necessary modifications in classrooms, laboratories, equipment, building accessibility, and lavatories.

For notetaking the student can: (a) use a tape recorder, (b) have a classmate slip a carbon copy into his/her notebook to duplicate notes, and/or (c) have the instructor prepare an outline of the lecture.

For exams the instructor can: (a) give oral exams, (b) have the student dictate answers into a tape recorder or to another student, or (c) utilize a typewriter/computer if the student is able to type/keyboard.

Give the student more time to complete homework assignments. Also, giving the student advance notification of assignments is helpful.

In the laboratory, pair the student with one or more capable students in the class.

Enlarge copies of frequently used charts and diagrams posted near the student's desk eliminates the necessity of paging through a book.

Instructing Students Who Are Other Health-Impaired

Allow the students sufficient time for rest.

Seat the student in the most convenient place for easy access to necessary facilities (hall, lavatory, chalkboard, laboratory work stations).

Allow the students to work on program requirements at his or her own pace.

Tape lectures so the student can listen to them at home.

Work cooperatively with the health team in order to learn more about the student's special needs.

Utilize community resources personnel (social workers and itinerant teachers for home-bound students) for delivery of materials, assignments, and handouts.

Instructing Students Who Have Specific Learning Disabilities

Use visuals and demonstrations as often as possible.

Use concrete examples whenever possible.

Provide student with an outline of what will be covered in class.

Make sure all printed materials are clear and readable.

If the student has a visual perception problem, allow him or her to tape-record assignments.

Allow students to take tests orally or in a mode that compliments their performance.

Present new information in small amounts.

Make sure that writing assignments are relevant to the content of the program.

Allow students a longer period of time to complete assignments, if necessary.

List assignments in steps.

Task analysis can be used to lower the frustration level of these learners.

Programmed instruction materials can be very effective with these learners.

The following is a list of specific teaching strategies which can be very useful when working with students who have **limited English proficiency** (Sarkees & Scott, 1985):

Recognize the student's cultural background and allow for the student's individual differences.

Encourage these students to bring dictionaries to class.

Use demonstrations and hands-on experience as much as possible.

Speak slowly and use simple vocabulary and grammar.

Use bright felt tip markers to mark important words, passages, or illustrations.

If possible, use a translator for important concepts.

Work closely with LEP support personnel.

Keep homework assignments short.

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Check for comprehension by asking the student what you have said.

Use simple sentences when writing test items so the student can concentrate on answering the question rather than deciphering it.

And finally, with regard to the disadvantaged population, typically these individuals dislike school, lack motivation, and have a low self-concept or esteem. Therefore, an educator's personal commitment and high expectations for the student may be two of the biggest single factors which will make a positive difference in this individual's life. Additionally, an educator's good example (i.e., being patient, understanding, well organized, and a good manager) can be extremely valuable in motivating and positively shaping the student's behavior (Baca, 1981). Vocational education can offer a great deal to the disadvantaged student in terms of teaching academic and social skills relative to the student's potential employment (Baca, 1981). The following are additional techniques or teaching strategies which can be very useful when working with disadvantaged students (Baca, 1981):

The educator should seek to understand the student's educational and social background through: (a) assessment information, (b) interaction with former teachers, (c) discussions with counselors, and (d) visits with parents to ascertain the student's social limitations and home situation.

Basic math, communication, and social skills should be reinforced. Math skills can be reinforced through hands-on learning activities. Communication skills can be improved by tactfully correcting poor grammar, when appropriate, and by providing resources that encourage reading in job related interests. Social skills such as getting along with people, grooming, proper dress, and respect for property and authority should be reinforced on a continual basis.

The importance of finishing school should be continually stressed. Relate acquisition of job skills to earn income.

Reinforce the student's feelings of self-worth by having high expectations for the student and by providing immediate reinforcement for work done well.

Simulate realistic job situations. All classroom and laboratory experiences should relate to employment in the occupation being studied.

Disadvantaged students (as all students) will typically react to the learning environment in a responsible and mature manner when they are treated with respect and as adults by the educator.

Classroom organization and discipline (being firm but not overbearing) are especially important. Generally, disadvantaged students want and need structure and discipline within their lives. Usually, these individuals will be responsive to and respect teachers who are firm, but sensitive.

Help the student develop employability and job coping skills (i.e., skills associated with finding, applying for, and retaining a job).

Help the student establish good work habits by keeping him or her involved with meaningful learning experiences. Each activity should have concrete learning objectives.

Disadvantaged students may need more encouragement to stay on task; however, they still should be required to complete all assignments (just as they will be required to do on the job).

Present instructions and information in clear, logical steps--building from the simple to the complex.

Technical terms should be communicated clearly and concisely and written in language which the students will understand.

Incorporate a variety of instructional methods in the curriculum (i.e., demonstrations, resource personnel, field trips, peer tutors, role playing. audio-visual aids, and on-site work experiences).

Present supplemental materials when appropriate. If such material is relevant to the acquisition of job skills, the student will not be humiliated by simplified material.

Highlight important parts of the student's text with a light marker to prevent the student from feeling overwhelmed with a larger volume of reading material.

Progress charts can be utilized to motivate disadvantaged students to master new skills.

Utilize flash cards (teacher made or commercial) to reinforce new terms and the use of tools and equipment.

When teaching special needs students, it is very important that instructors do not limit their instructional techniques. Therefore, the following abstract of instructional techniques or strategies has been prepared which could be considered generic to all special needs populations.

- Involve as many different senses as possible
- Use concrete terms
- Have students repeat important information
- Use lists rather than paragraphs for written directions
- Teach by demonstration
- Use hand-over-hand assistance when necessary
- Allow practice time
- Break complex operations into smaller tasks
- Provide immediate feedback
- Build confidence

- Help student make correct discriminations
- Help student with their retention/memory
- Help student generalize knowledge
- Build rapport
- Use appropriate body language
- Use appropriate techniques when working with an interpreter

- Maintain good eye contact
- Speak slowly and clearly
- Rephrase thoughts when necessary
- Encourage the student to read ahead
- Keep the noise level down
- Utilize various forms of media
- Use lights to indicate when dangerous machinery is on
- Work cooperatively with therapists
- Encourage peer tutoring
- Try not to act uncomfortable around special needs students
- Help students feel comfortable
- Model correct sentence structure
- Develop a list of technical terms for students and/or therapists

- Orient students before the course begins
- Provide handouts ahead of time
- Maintain student's attention
- Use tape recorders for note taking
- Try to understand the student
- Communicate acceptance
- Develop success experiences for the student

- Use appropriate behavioral management techniques
- Facilitate the students with their notetaking
- Facilitate the students with exams

- Pair students
- Enlarge charts and diagrams
- Use clear readable visuals frequently
- Provide an outline of material which is being taught

- Writing assignments should be relevant
- Use task analysis when necessary
- Allow for individual differences
- Encourage students to bring a dictionary
- Use felt tip marker to highlight important parts
- Do not make homework assignments too lengthy

- Use simple sentences when writing test items

- Reinforce basic education and work skills
- Reinforce the importance of finishing school
- Reinforce the student's feelings of self-worth

- Simulate realistic job situations
- Treat all students with respect and dignity
- Provide structure and organization
- Utilize progress charts
- Utilize flash cards

Remediation in the Basic Education Skills

It is very important to note that some students may need to acquire one or more basic education skills (i.e., mathematics, reading, writing, speaking, listening, interpersonal relations, and/or reasoning skills) to succeed in a vocational program. In addition, many employers will not hire an individual if he or she lacks these skills. Therefore, instruction in basic education skills may be necessary by the vocational educator. For information concerning basic or generalized skills instruction see Module 8.

Brown's 3-C Model

Brown's 3-C Model helps tie together many of the educational aspects discussed in this Overview. In general, Brown suggests that when delivering instruction to learners with special needs, the instructor can enhance the student's success rate and reduce feelings of frustration by considering the following 3-Cs of instruction: (a) correction, (b) compensation, and (c) circumvention (Brown & Dayser, 1982):

Correction. Providing feedback when the student's skills are being developed, thereby, correcting inappropriate behaviors immediately after they appear. Employing remedial reading and math services to enhance the student's ability to function within the program.

Compensation. Helping the student realize that each task represents only one of many activities contained in the course and that weaknesses in one area can often be offset by strengths in other areas. It should be communicated to the student that some tasks are inherently difficult and that he/she should not expect to achieve success immediately. Further efforts to compensate for the student would be to modify or adjust the delivery of instruction to extend over segments of several class periods. In addition, reinforcement during the early stages of instruction should be amply provided.

Note: Basically, "compensation" involves the instructor's modifications to the curriculum, learning environment, and instruction which has been discussed in this Overview.

Circumvention. If the vocational program is way out of reach for a student, for example, due to a course requirement of a relatively high level of reading skill, it may become necessary for the student to "circumvent" this difficulty by discussing alternate training programs with a vocational counselor.

Summary

Modification of curriculum, learning environment, and instruction can be an important key to successful employment training for special needs students. It requires that the instructor know his/her content completely, but the benefits to all students will likely be extraordinary.

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APPENDIX F

2 + 2 + 2 ARTICULATION PROJECT

1987 - 1988

DALLAS COUNTY COMMUNITY COLLEGE DISTRICT

2 + 2 + 2 ARTICULATION

As a result of the changes in office information systems technology, the electronic office requires a work force with many diverse skills and attributes. The traditional job categories and job titles of office workers have been replaced with an encyclopedia of positions supporting office information systems functions and activities.

To train the office personnel required to support these positions, the two-year secondary office education training program or the two-year community college office careers degree program may not provide the extensive training that business and industry requires. Most office information systems management positions require four-year college degrees.

In the past, office education programs offered through the high schools and the community colleges have presented duplicated training plans. Students who chose to enroll in community college office careers programs after high school often had to repeat many of the same competencies that they mastered in their high school vocational programs. If the students transferred to a four-year university program, many of the courses would not transfer. In most instances, the university program was a duplication of the high school and the community college training programs.

In order to prepare the office information systems workforce of the future, high schools, community colleges, and universities must develop coordinated training programs that help students in making a smooth transition from one educational level to another without experiencing delays, duplication of effort, or loss of credit.

A 2 + 2 + 2 articulation program in the area of office information systems will be developed in this six-year project. The program will provide a complete six-year training program that begins in grade eleven and joins the two-year Dallas County Community College degree program with the junior and senior years of the four-year University of North Texas Office Technology program. Several other junior and senior colleges and universities in Texas have shown interest in participating in this articulation project. The 2 + 2 + 2 articulation program will be developed according to the following process:

Phase 1: The project administrator and the curriculum development specialist will establish a steering committee to develop a plan of action for project implementation. The steering committee will be divided into subcommittees to provide input into the development of the surveys, competency chart, secondary curriculum guides, competency profile, and the evaluation, tracking, and follow-up system.

Phase 2: Businesses and industries in the Dallas-Fort Worth area and in three additional metropolitan areas will be surveyed by the project administrator and the curriculum development specialist to determine employment needs and to define the occupational career path for office information systems from entry level to management. Surveys will be completed and tabulated by November 15, 1987.

Phase 3: DACUM analyses will be conducted of each major occupational category in the career path. The project administrator and the curriculum development specialist will serve as DACUM coordinators and two trained DACUM consultants will be hired to facilitate the DACUM's. The first DACUM will be completed and validated by February 1, 1987. It is anticipated that the remaining DACUM'S will be completed and validated by March 1, 1988. A competency continuum chart will then be developed by occupational category (entry level to advanced).

Phase 4: The project administrator and the curriculum development specialist will work with representatives from the Occupational Curriculum Laboratory, East Texas State University, Dallas County secondary and DCCCD office education (information systems) faculty, and representatives from business and industry to develop the curriculum guides (including course outlines and instructional materials) and competency profiles using the results of validated DACUM analyses. Curriculum guides will meet the approved TEA guidelines for the State Office Education occupational cluster curriculum. Curriculum guides and profiles will be completed by May 15, 1988.

Phase 5: The project administrator and the curriculum development specialist will work with a subcommitte of Dallas County secondary and DCCCD office education (information systems) faculty to develop a process to evaluate and upgrade course content and curriculum materials. Evaluation system will be completed and tested by May 15, 1988.

Phase 6: The project administrator and the curriculum development specialist will conduct a curriculum workshop for secondary office education (information systems) faculty in Dallas County to review the curriculum guides including instructional materials and competency profiles. The workshop will be scheduled prior to June 15, 1988.

Phase 7: The project administrator and the curriculum development specialist will work with a subcommittee of Dallas County secondary and DCCCD office education (information systems) faculty, occupational administrators, and placement personnel to develop a system to track students from grade eleven through the two-year community college and university programs. The Follow-up System will be compatible with the new DCCCD Career Planning and Placement System. The Follow-up System will be reviewed by the steering committee prior to June 15, 1988.

Phase 8: The project administrator will work with vocational administrators from the Dallas Independent School Districts to revise existing articulation agreements. Agreements will be revised prior to June 30, 1988.

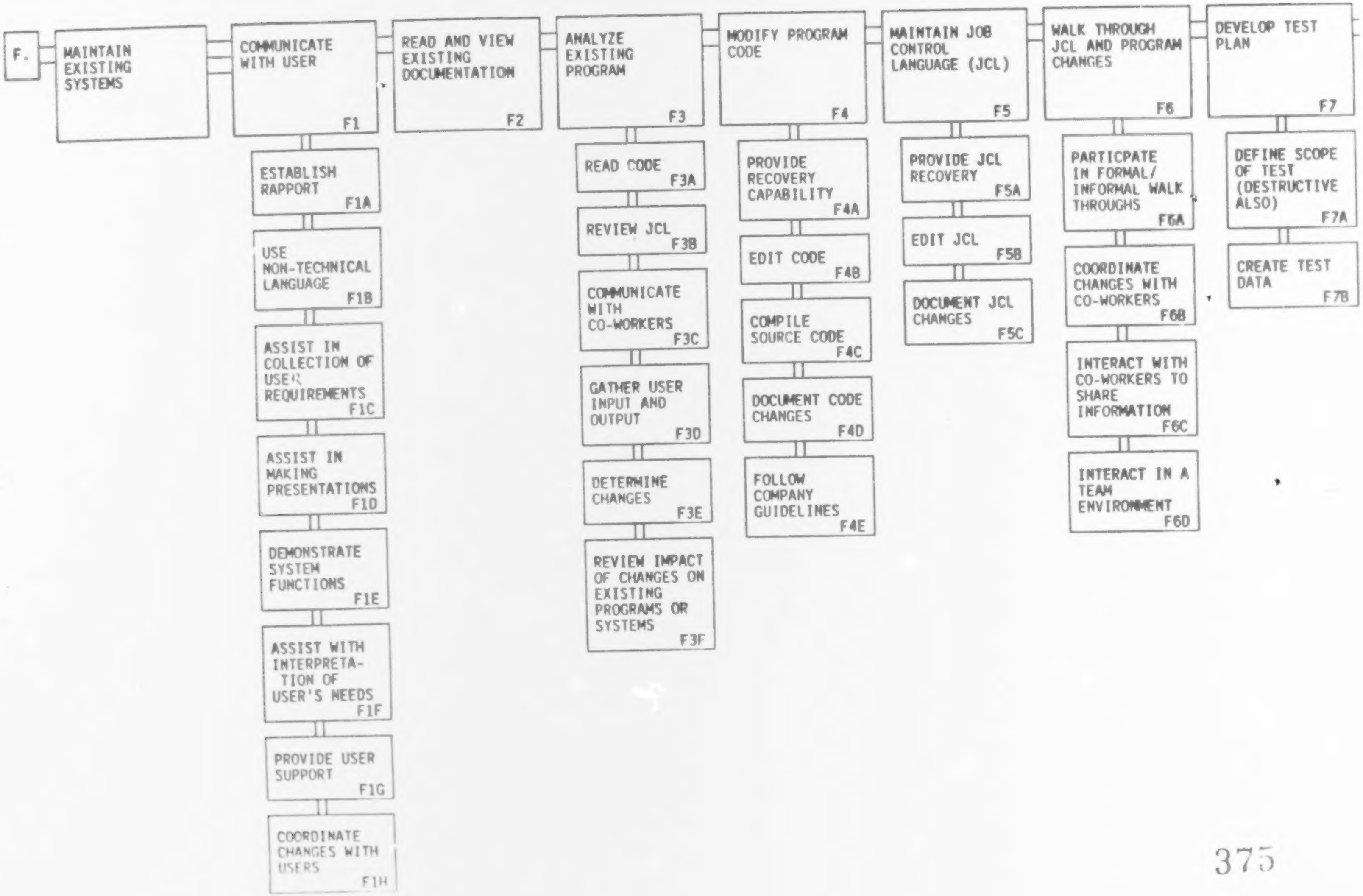
COMPETENCY PROFILE

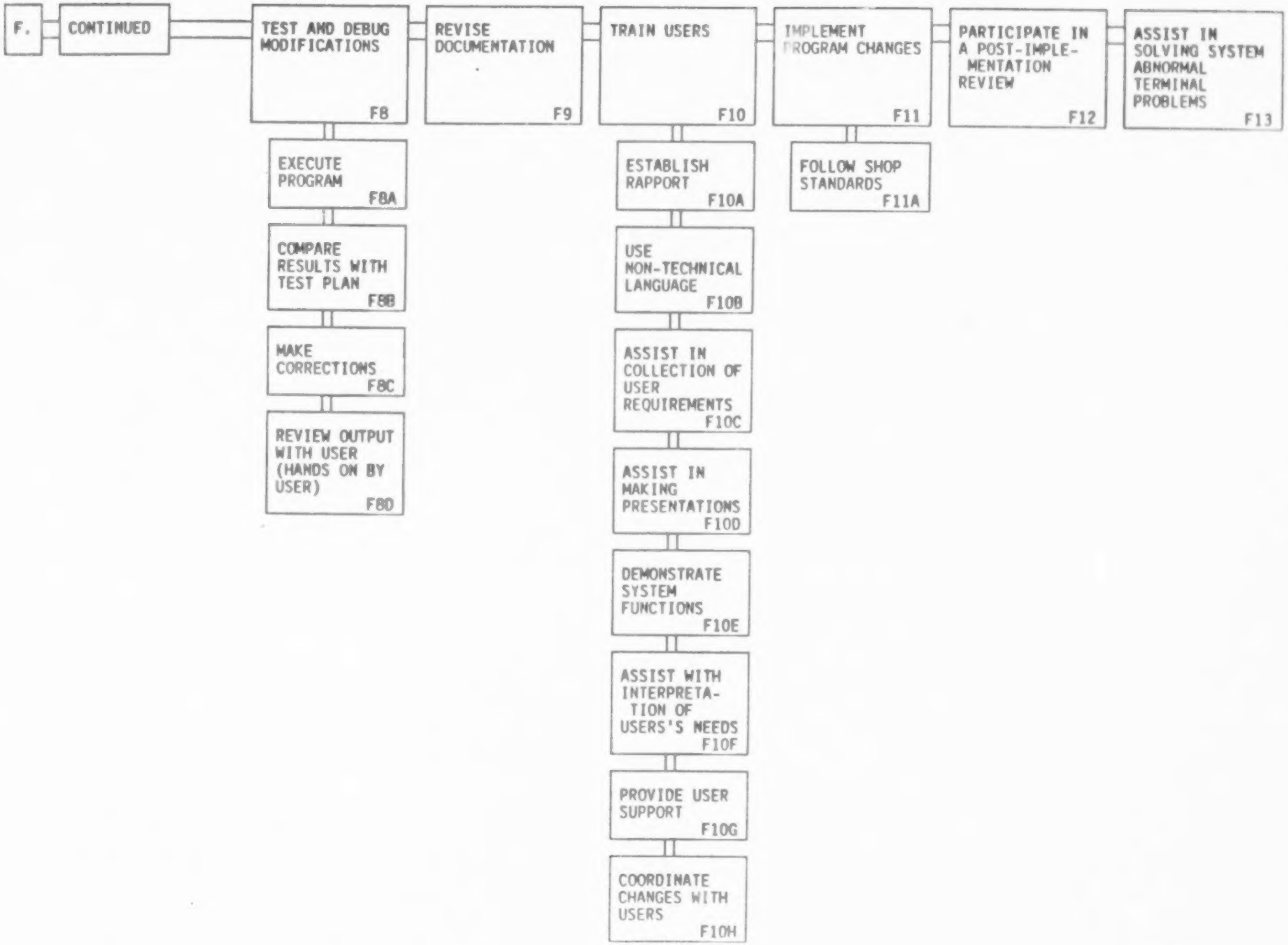
OF

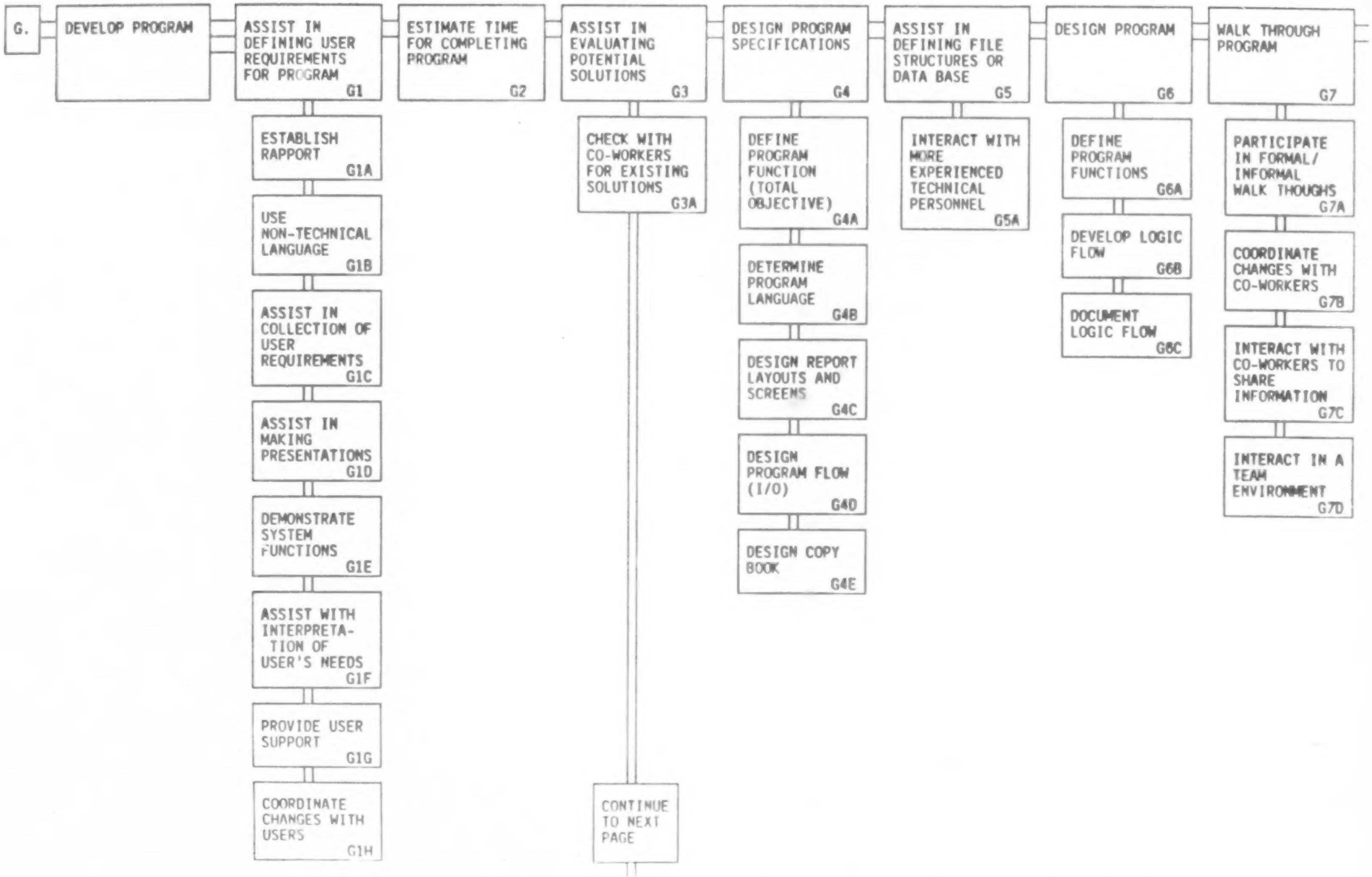
COMPUTER PROGRAMMER/ANALYST

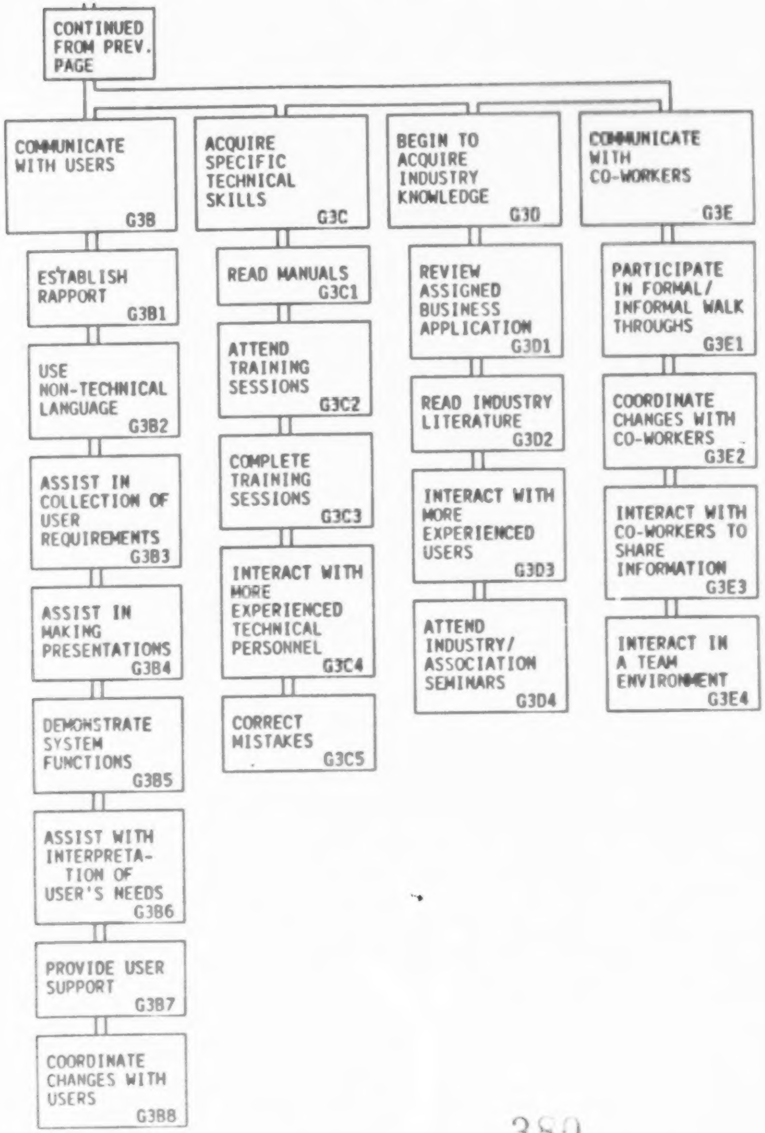
COMPUTER PROGRAMMER/ANALYST DACUM CHART

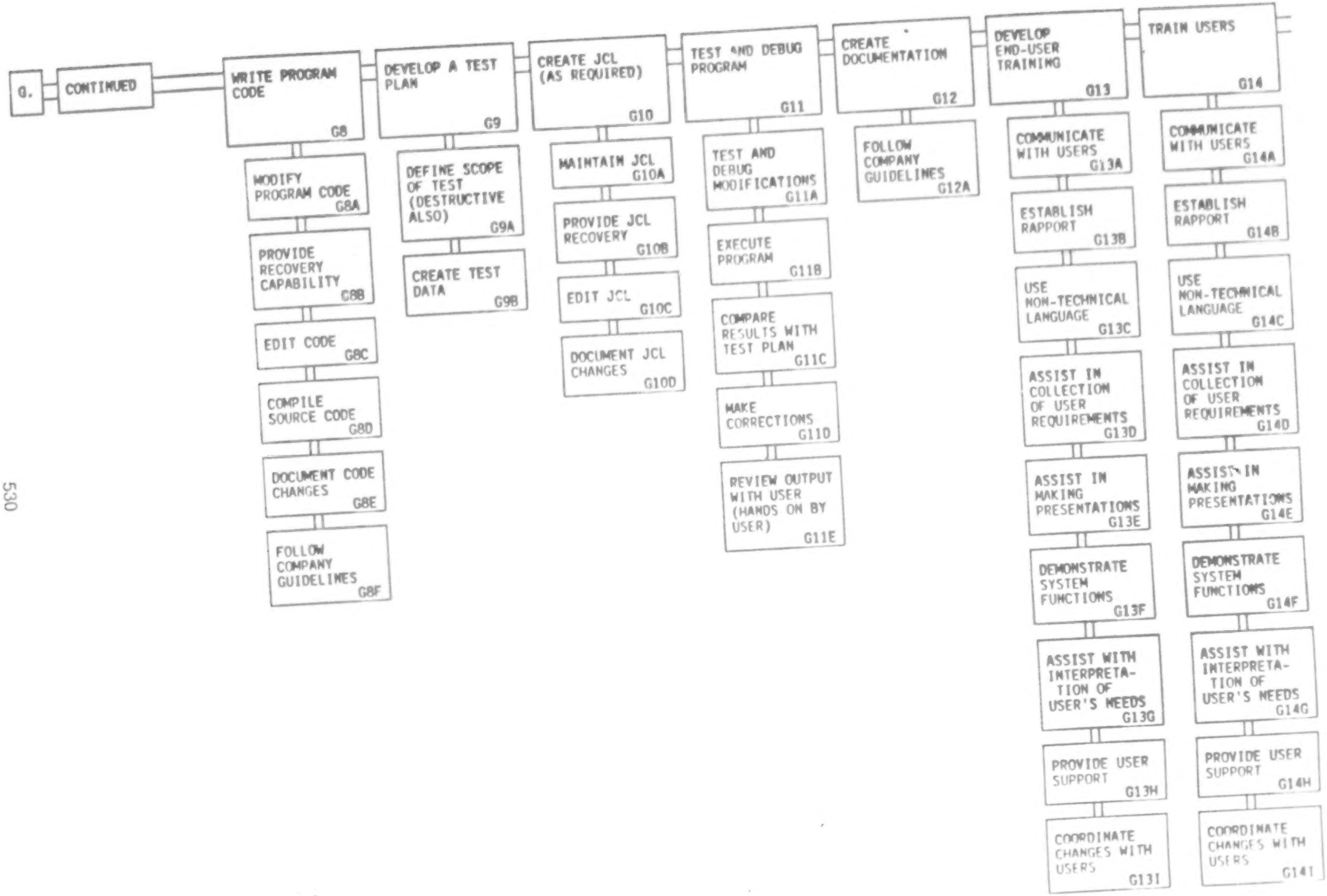
	DUTIES	TASKS						
A.	COMMUNICATE WITH MANAGERS	RECORD TIME A1	WRITE STATUS REPORT A2	STATE PROGRESS ON TASK A3	REPORT PROBLEMS A4	MAKE RECOMMENDATIONS A5	ASSIST IN MAKING PRESENTATIONS A6	
B.	COMMUNICATE WITH USERS	ESTABLISH RAPPORT B1	USE NON-TECHNICAL LANGUAGE B2	ASSIST IN COLLECTION OF USER REQUIREMENTS B3	ASSIST IN MAKING PRESENTATIONS B4	DEMONSTRATE SYSTEM FUNCTIONS B5	ASSIST WITH INTERPRETATION OF USER'S NEEDS B6	PROVIDE USER SUPPORT B7
B.	CONTINUED	COORDINATE CHANGES WITH USERS B8						
C.	ACQUIRE SPECIFIC TECHNICAL SKILLS	READ MANUALS C1	ATTEND TRAINING SESSIONS C2	COMPLETE TRAINING ASSIGNMENTS C3	INTERACT WITH MORE EXPERIENCED TECHNICAL PERSONNEL C4	CORRECT MISTAKES C5		
D.	BEGIN TO ACQUIRE INDUSTRY KNOWLEDGE	REVIEW ASSIGNED BUSINESS APPLICATION D1	READ INDUSTRY LITERATURE D2	INTERACT WITH MORE EXPERIENCED USERS D3	ATTEND INDUSTRY/ ASSOCIATION SEMINARS D4			
E.	COMMUNICATE WITH CO-WORKERS	PARTICIPATE IN FORMAL/INFORMAL WALK THROUGHS E1	COORDINATE CHANGES WITH CO-WORKERS E2	INTERACT WITH CO-WORKERS TO SHARE INFORMATION E3	INTERACT IN A TEAM ENVIRONMENT E4			

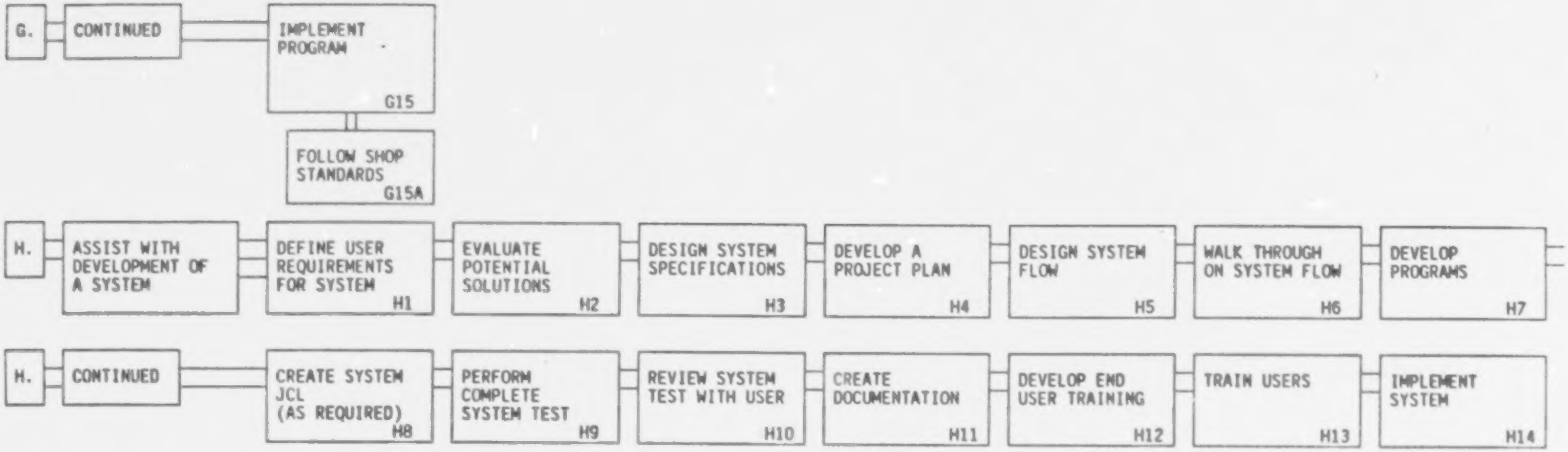

F.
MAINTAIN EXISTING SYSTEMS
COMMUNICATE WITH USER F1
ESTABLISH RAPPORT F1A
USE NON-TECHNICAL LANGUAGE F1B
ASSIST IN COLLECTION OF USER REQUIREMENTS F1C
ASSIST IN MAKING PRESENTATIONS F1D
DEMONSTRATE SYSTEM FUNCTIONS F1E
ASSIST WITH INTERPRETATION OF USER'S NEEDS F1F
PROVIDE USER SUPPORT F1G
COORDINATE CHANGES WITH USERS F1H
READ AND VIEW EXISTING DOCUMENTATION F2
ANALYZE EXISTING PROGRAM F3
READ CODE F3A
REVIEW JCL F3B
COMMUNICATE WITH CO-WORKERS F3C
GATHER USER INPUT AND OUTPUT F3D
DETERMINE CHANGES F3E
REVIEW IMPACT OF CHANGES ON EXISTING PROGRAMS OR SYSTEMS F3F
MODIFY PROGRAM CODE F4
PROVIDE RECOVERY CAPABILITY F4A
EDIT CODE F4B
COMPILE SOURCE CODE F4C
DOCUMENT CODE CHANGES F4D
FOLLOW COMPANY GUIDELINES F4E
MAINTAIN JOB CONTROL LANGUAGE (JCL) F5
PROVIDE JCL RECOVERY F5A
EDIT JCL F5B
DOCUMENT JCL CHANGES F5C
WALK THROUGH JCL AND PROGRAM CHANGES F6
PARTICPATE IN FORMAL/INFORMAL WALK THROUGHS F6A
COORDINATE CHANGES WITH CO-WORKERS F6B
INTERACT WITH CO-WORKERS TO SHARE INFORMATION F6C
INTERACT IN A TEAM ENVIRONMENT F6D
DEVELOP TEST PLAN F7
DEFINE SCOPE OF TEST (DESTRUCTIVE ALSO) F7A
CREATE TEST DATA F7B


F.
CONTINUED
TEST AND DEBUG MODIFICATIONS F8
EXECUTE PROGRAM F8A
COMPARE RESULTS WITH TEST PLAN F8B
MAKE CORRECTIONS F8C
REVIEW OUTPUT WITH USER (HANDS ON BY USER) F8D
REVISE DOCUMENTATION F9
TRAIN USERS F10
ESTABLISH RAPPORT F10A
USE NON-TECHNICAL LANGUAGE F10B
ASSIST IN COLLECTION OF USER REQUIREMENTS F10C
ASSIST IN MAKING PRESENTATIONS F10D
DEMONSTRATE SYSTEM FUNCTIONS F10E
ASSIST WITH INTERPRETA-TION OF USERS'S NEEDS F10F
PROVIDE USER SUPPORT F10G
COORDINATE CHANGES WITH USERS F10H
IMPLEMENT PROGRAM CHANGES F11
FOLLOW SHOP STANDARDS F11A
PARTICIPATE IN A POST-IMPLE-MENTATION REVIEW F12
ASSIST IN SOLVING SYSTEM ABNORMAL TERMINAL PROBLEMS F13


G.
DEVELOP PROGRAM
ASSIST IN DEFINING USER REQUIREMENTS FOR PROGRAM G1
ESTIMATE TIME FOR COMPLETING PROGRAM G2
ASSIST IN EVALUATING POTENTIAL SOLUTIONS G3
DESIGN PROGRAM SPECIFICATIONS G4
ASSIST IN DEFINING FILE STRUCTURES OR DATA BASE G5
DESIGN PROGRAM G6
WALK THROUGH PROGRAM G7
ESTABLISH RAPPORT G1A
USE NON-TECHNICAL LANGUAGE G1B
ASSIST IN COLLECTION OF USER REQUIREMENTS G1C
ASSIST IN MAKING PRESENTATIONS G1D
DEMONSTRATE SYSTEM FUNCTIONS G1E
ASSIST WITH INTERPRETATION OF USER'S NEEDS G1F
PROVIDE USER SUPPORT G1G
COORDINATE CHANGES WITH USERS G1H
CHECK WITH CO-WORKERS FOR EXISTING SOLUTIONS G3A
CONTINUE TO NEXT PAGE
DEFINE PROGRAM FUNCTION (TOTAL OBJECTIVE) G4A
DETERMINE PROGRAM LANGUAGE G4B
DESIGN REPORT LAYOUTS AND SCREENS G4C
DESIGN PROGRAM FLOW (I/O) G4D
DESIGN COPY BOOK G4E
INTERACT WITH MORE EXPERIENCED TECHNICAL PERSONNEL G5A
DEFINE PROGRAM FUNCTIONS G6A
DEVELOP LOGIC FLOW G6B
DOCUMENT LOGIC FLOW G6C
PARTICIPATE IN FORMAL/INFORMAL WALK THOUGHS G7A
COORDINATE CHANGES WITH CO-WORKERS G7B
INTERACT WITH CO-WORKERS TO SHARE INFORMATION G7C
INTERACT IN A TEAM ENVIRONMENT G7D


CONTINUED FROM PREV. PAGE
COMMUNICATE WITH USERS G3B
ESTABLISH RAPPORT G3B1
USE NON-TECHNICAL LANGUAGE G3B2
ASSIST IN COLLECTION OF USER REQUIREMENTS G3B3
ASSIST IN MAKING PRESENTATIONS G3B4
DEMONSTRATE SYSTEM FUNCTIONS G3B5
ASSIST WITH INTERPRETATION OF USER'S NEEDS G3B6
PROVIDE USER SUPPORT G3B7
COORDINATE CHANGES WITH USERS G3B8
ACQUIRE SPECIFIC TECHNICAL SKILLS G3C
READ MANUALS G3C1
ATTEND TRAINING SESSIONS G3C2
COMPLETE TRAINING SESSIONS G3C3
INTERACT WITH MORE EXPERIENCED TECHNICAL PERSONNEL G3C4
CORRECT MISTAKES G3C5
BEGIN TO ACQUIRE INDUSTRY KNOWLEDGE G3D
REVIEW ASSIGNED BUSINESS APPLICATION G3D1
READ INDUSTRY LITERATURE G3D2
INTERACT WITH MORE EXPERIENCED USERS G3D3
ATTEND INDUSTRY/ ASSOCIATION SEMINARS G3D4
COMMUNICATE WITH CO-WORKERS G3E
PARTICIPATE IN FORMAL/ INFORMAL WALK THROUGHS G3E1
COORDINATE CHANGES WITH CO-WORKERS G3E2
INTERACT WITH CO-WORKERS TO SHARE INFORMATION G3E3
INTERACT IN A TEAM ENVIRONMENT G3E4


G.
CONTINUED
WRITE PROGRAM CODE G8
MODIFY PROGRAM CODE G8A
PROVIDE RECOVERY CAPABILITY G8B
EDIT CODE G8C
COMPILE SOURCE CODE G8D
DOCUMENT CODE CHANGES G8E
FOLLOW COMPANY GUIDELINES G8F
DEVELOP A TEST PLAN G9
DEFINE SCOPE OF TEST (DESTRUCTIVE ALSO) G9A
CREATE TEST DATA G9B
CREATE JCL (AS REQUIRED) G10
MAINTAIN JCL G10A
PROVIDE JCL RECOVERY G10B
EDIT JCL G10C
DOCUMENT JCL CHANGES G10D
TEST AND DEBUG PROGRAM G11
TEST AND DEBUG MODIFICATIONS G11A
EXECUTE PROGRAM G11B
COMPARE RESULTS WITH TEST PLAN G11C
MAKE CORRECTIONS G11D
REVIEW OUTPUT WITH USER (HANDS ON BY USER) G11E
CREATE DOCUMENTATION G12
FOLLOW COMPANY GUIDELINES G12A
DEVELOP END-USER TRAINING G13
COMMUNICATE WITH USERS G13A
ESTABLISH RAPPORT G13B
USE NON-TECHNICAL LANGUAGE G13C
ASSIST IN COLLECTION OF USER REQUIREMENTS G13D
ASSIST IN MAKING PRESENTATIONS G13E
DEMONSTRATE SYSTEM FUNCTIONS G13F
ASSIST WITH INTERPRETA-TION OF USER'S NEEDS G13G
PROVIDE USER SUPPORT G13H
COORDINATE CHANGES WITH USERS G13I
TRAIN USERS G14
COMMUNICATE WITH USERS G14A
ESTABLISH RAPPORT G14B
USE NON-TECHNICAL LANGUAGE G14C
ASSIST IN COLLECTION OF USER REQUIREMENTS G14D
ASSIST IN MAKING PRESENTATIONS G14E
DEMONSTRATE SYSTEM FUNCTIONS G14F
ASSIST WITH INTERPRETA-TION OF USER'S NEEDS G14G
PROVIDE USER SUPPORT G14H
COORDINATE CHANGES WITH USERS G14I


G.
CONTINUED
IMPLEMENT PROGRAM
G15
FOLLOW SHOP STANDARDS
G15A
H.
ASSIST WITH DEVELOPMENT OF A SYSTEM
DEFINE USER REQUIREMENTS FOR SYSTEM
H1
EVALUATE POTENTIAL SOLUTIONS
H2
DESIGN SYSTEM SPECIFICATIONS
H3
DEVELOP A PROJECT PLAN
H4
DESIGN SYSTEM FLOW
H5
WALK THROUGH ON SYSTEM FLOW
H6
DEVELOP PROGRAMS
H7
H.
CONTINUED
CREATE SYSTEM JCL (AS REQUIRED)
H8
PERFORM COMPLETE SYSTEM TEST
H9
REVIEW SYSTEM TEST WITH USER
H10
CREATE DOCUMENTATION
H11
DEVELOP END USER TRAINING
H12
TRAIN USERS
H13
IMPLEMENT SYSTEM
H14

(First Job)
PROGRAMMER/ANALYST

JOB TITLES

- JUNIOR PROGRAMMER/ANALYST
- SOFTWARE ENGINEER
- ANALYST/PROGRAMMER
- ASSOCIATE PROGRAMMER
- SYSTEM ENGINEER

ATTITUDES/TRAITS

- ADAPTABILITY
- WILLINGNESS TO CHANGE
- EXTROVERT PERSONALITY
- DETAIL-ORIENTED
- SELF-MOTIVATED - QUEST FOR KNOWLEDGE
- CORPORATE CITIZEN/VOLUNTEER EFFORT
- OK TO MAKE MISTAKES (ONCE)
- WILLINGNESS TO LEARN FROM MISTAKES
- WILLINGNESS TO ADMIT WHEN YOU NEED HELP
- WILLINGNESS TO SHARE/EXCHANGE INFORMATION WITH CO-WORKERS
- SUPPRESS EGO

KNOWLEDGE/SKILLS

SHOP STANDARDS

- NAMING
- CODING
- DOCUMENTATION
- JCL

- HOW TO MAKE ORAL AND WRITTEN PRESENTATIONS

- COMMUNICATION SKILLS (Including keyboarding and clerical skills)

- LANGUAGES
  - PC
    - BASIC
    - "C"
    - D-BASE-III
    - PASCAL
    - COBOL
    - FORTRAN
    - ASSEMBLY LANGUAGES
  - MAINFRAME/MINI COMPUTERS
    - COBOL
    - ASSEMBLY
    - RPG (BIG ON SYSTEM MINIS AND CG's)
    - FORTRAN/SCIENTIFIC
    - FOURTH GENERATION LANGUAGE
      - FOCUS
      - RAMIS
      - SAS

- STRUCTURED PROGRAMMING TECHNIQUES

- CODE GENERATORS

- DATA PROCESS MANAGEMENT

- HIERARCHICAL/RELATIONAL PROGRAMMING
- ON-LINE PROGRAMMING
- "DUMP" READING
- ESTIMATING LENGTH OF TIME FOR PROJECT
- TESTS
    - DESTRUCTIVE WITH INVALID DATA
    - EDIT TESTING
    - OUT OF SEQUENCE/IN SEQUENCE NUMBER OF TRANSACTIONS
    - VOLUME
    - CROSS-TEST VARIETIES OF DATA
    - STRESS-TEST NUMBER OF PEOPLE ON-LINE SIMULTANEOUSLY
- DOCUMENTATION PROGRAMS
    - PSEUDO CODE
    - FLOW CHARTS
    - HIPO (HIERARCHICAL PROCESSING INPUT/PROCESSING OUTPUT)
    - V/TOC (VISUAL TABLE OF CONTENTS)
    - DECISION TABLES
    - WAINER/ORR
    - CHAPIN CHART/NASSI-SCHNEIDER MAP
- DATA BASES
    - IMS/CICS-DL1
    - ADR/DATA-COM
    - ADABAS
    - DB2 and SQL/DS
    - ORACLE (CROSSES MANY MACHINES)
    - INGRES
- TOOLS (SOFTWARE)
    - INTER-TEST)
    - TSO/ISPF)
    - LIBRARIAN) THESE ARE ALL IBM TOOLS
    - PANVALET)
    - ROSCOE)
    - VOLLIE)

FUTURE PROJECTIONS

- EGOLESS PROGRAMMING
- PREPACKAGE APPLICATIONS i.e. "TURN-KEY"
- SHIFT FROM SKILLS IN PROGRAMMING TO RELATIONSHIPS WITH USER -- TO INTERPRET NEEDS AND TO ANALYZE AND DESIGN USER APPLICATIONS
- INCREASE IN INDUSTRY KNOWLEDGE COULD BECOME "USER" ANALYST (PARTICULARLY WITH FOURTH GENERATION LANGUAGES)

- DP IS AUTOMATING ITSELF
- FEWER TECHNICAL PEOPLE EMPLOYED TO DEVELOP SYSTEM/SOFTWARE PACKAGES; MOST WILL BE USER ANALYSTS
- PC PROLIFERATING-MORE FUNCTIONS
    - LINKS TO MAINFRAME
    - MAINFRAME CAPABILITY MOVES TO DESKTOP
    - MAINFRAME MAINTAINS CENTRALIZED DATABASE
    - DATABASE/CENTRALIZED-DATA PROCESSING DECENTRALIZED

APPENDIX G

BLOOM'S TAXONOMY OF THINKING PROCESSES

DOMAINS	LEARNER OUTCOMES	VERBS
EVALUATION: (judging)	The learner forms a judgment based on facts, examples, and specific criteria.	appraises, compares, concludes, contrasts, criticizes, describes, discriminates, explains, justifies, interprets, relates, summarizes, supports, judges, evaluates, critiques
SYNTHESIS: (creating new)	The learner takes knowledge which is new to him/her and creates a whole from the bits and pieces.	categorizes, combines, complies, composes, creates, devises, designs, explains, generates, modified, organizes, plans, rearranges, reconstructs, relates, reorganizes, revises
ANALYSIS: (taking apart)	The learner either breaks down an idea into its principal parts OR shows similarities/differences between things.	breaks down, diagrams, differentiates, discriminates, distinguishes, identifies, illustrates, infers, outlines, points out, relates, selects, separates, subdivides, analyzes, dissects, examines
APPLICATION: (using)	The learner does something with what they have learned. (using the information)	changes, computes, demonstrates, discovers, manipulates, modifies, operates, predicts, prepares, produces, relates, shows, solves, uses, applies, practices, employs, uses
COMPREHENSION: (understanding)	The learner changes the form of previously learned information either by translation, interpretation, or extrapolation. (understanding the information)	defends, distinguishes, estimates, explains, extends, generalizes, gives examples, infers, paraphrases, predicts, rewrites, summarizes, transforms, changes, restates
KNOWLEDGE:	The learner recalls or recognizes information previously presented to him/her	defines, describes, identifies, labels, lists, matches, names, outlines, reproduces, selects, states, tells, recalls, remembers, repeats, recognizes

APPENDIX H

SUPPLEMENTARY UNIT

SYSTEM DEVELOPMENT PROCESS

SYSTEM DEVELOPMENT

UNIT OBJECTIVE:

Students will summarize and give examples of the tasks programmers perform which enhance their professionalism.

STUDENT OBJECTIVES:

After the completion of this unit students will be able to:

1. Review five current computer periodicals/newspapers that consistently contain articles in the system development area.
2. Identify sources of technical training and information exchanges available to the computer professional.
3. Describe the parts of technical manuals that assist the user in becoming more familar with a product or a system.
4. Describe various methods for tracking time spent on a project and the percentage of task remaining in order to keep a project on deadline and assist managers in charging project costs to the proper account.
5. Discuss the types of group communications and individual leadership styles.

GENERALIZATION:

In addition to participating in the design and coding of a program, programmers also perform tasks which enhance their professionalism.

UNIT OVERVIEW

I. Acquiring specific technical skills

A. Types of professional literature

1. Journals of professional organizations, such as ASM and DPMA
2. Product journals, such as PC World, MAC World
3. Periodicals organized around tasks, such as Automated Office, Infocenter
4. Computer periodicals, such as Computerworld, Infoworld, Datamation
5. User-group publications

B. Why professionals use literature

1. Stay abreast of new developments in programming theory
2. Keep current on new products, both hardware and software
3. Discover solutions to problems rather than re-inventing the wheel

C. Types of professional organizations/associations

1. Computer associations, such as DPMA, ASM, ACM
2. User-groups for hardware and software
3. Industry-related organizations, such as those for accounting and banking

D. Types of technical seminars/courses

1. Vendor-related, both hardware and software
2. Training providers, such as James Martin
3. Professional organizations, such as DPMA, Data Trainer
4. Continuing education short-courses at community colleges and universities
5. Credit courses at community colleges and universities
6. In-house training courses
7. Organizations' annual conventions/workshops

8. Computer-based training
9. Videotape courses

E. Importance of networking through professional associations

1. Sharing problem-solving information
2. Becoming aware of new products
3. Making contacts who can help you find solutions to technical problems

F. Types of Manuals

1. Language specifications
2. Programmer's guide
3. User procedures
4. Company standards for programming
5. Error messages

G. How manuals are organized

1. Table of contents
2. Index
3. Tabbed sections
4. Error code organization

H. Why programmers/analysts use manuals

1. Read new information
2. Explain how to use a new product
3. Answer a specific question

I. Characteristics of good/bad manuals

1. Organization (or lack of it)
2. Poor indexing
3. Jargon vs. user-friendly writing

II. Communicating with the manager

  A. Need for recording time spent on various projects during a day

    1. Computer services are billed to the various departments for whom computer staff does work.

    2. Time statistics are important for management in making future estimations of time needed for various projects.

  B. Methods of recording time

    1. No set standard

    2. Timesheets for various projects

    3. Daily reporting

  C. Need for systematic status reports

    1. Managing project teams

      a. Periodic deadlines (milestones)

      b. Final deadlines

  D. Time estimations for a project

    1. Gathering statistics for future time estimations

    2. Judging programmer productivity

    3. How managers determine completion date of a project

  E. Methods for writing status reports

    1. Bullet reports

    2. Outline reports (phrase describing tasks completed for week reporting)

III. Communicating with co-workers

  A. Types of Groups

    1. Small

    2. Large

    3. Structured

    4. Unstructured

B. Roles

  1. Leadership

  2. Subordinate

  3. Team member

C. Group Objective

D. Communication Skills

E. Conflict Resolution

F. Individual Responsibility

CURRENT PERIODICALS LIST

INSTRUCTIONS: Visit a local bookstore, newsstand, school or public library and write down the titles of the computer periodicals/newspapers that it handles.

Name of source:

Title of computer-related magazine/newspaper:

1.

2.

3.

4.

5.

6.

7.

8.

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CONTACTING PROFESSIONAL ORGANIZATIONS

INSTRUCTIONS: Go to a school or local library and look up the names and addresses of at least five computer-related professional organizations. Type a letter, using a modified format, to three of the organizations requesting information concerning their organization, technical training seminars, and benefits of membership. Make sure that when you receive information, you write a short thank you note.

Name of Organization:

Address:

Name of Organization:

Address:

Name of Organization:

Address:

Name of Organization:

Address:

Name of Organization:

Address:

Suggested Letter Format:

Date

Inside Address

Dear (*name*):

In (*Mr./Ms./ Teacher's name, title of the class),* we are learning about various professional business and computer organizations. To help us find out more current information about these organizations, please send me information about your organization, (*name of the organization*). Also, please include information on how to start a student chapter, if this is supported by your organization. The materials will be used in class discussion and placed in our special computer resource file.

Please send the material to:

Student's Name
% Teacher's Name
School Name
Street Address
City, State Zip

If you have any other materials available that you feel would be useful, please enclose them also. Since our time is limited, please send the information as soon as possible. I will appreciate any help you can give me on this project.

Sincerely,

(Your Name)

LETTER FORMAT FOR INVITING A GUEST SPEAKER

INSTRUCTIONS: **Using the suggested basic letter format below, type a letter to an industry-related professional organization inviting them to send a representative to speak to the class about the group's activities and the advantages of membership. After the speaker has accepted, write a note to confirm the time and date of the speaking engagement. Follow up after the presentation with a short thank you note to show your appreciation.**

Date

Inside Address

Dear (*name*):

In (*Mr./Ms./ Teacher's name, title of the class),* we are learning about (*subject area*). In order to help us learn more about (*area, product, etc*.), would you be available on (*day, date*) at (*time*) to talk to our class about (*name of topic*) or other related areas?

If this date and time is inconvenient, please suggest another one. I am sure that we can work around your busy schedule. Please feel free to call (*Teacher's name*), at (*school phone*) by (*date*) so that we may complete our plans for making this unit more exciting and relevant.

Sincerely,

(*Your Name*)

LETTER FORMAT OF A REQUEST FOR TRAINING INFORMATION

INSTRUCTIONS: **Using the suggested basic letter format below, type a letter to a vendor requesting brochures announcing their computer related seminars. When you receive the information write a short thank you note to show your appreciation.**

Date

Inside Address

Dear (*name*):

In (*Mr./Ms./ Teacher's name, title of the class,*) we are learning about computer related training that is available in our area. Please assist us in making a complete list of these training opportunities. The information will be shared in class discussion and compiled in a list for distribution to our class members for their notebooks and further reference.

Please send the material to:

Student's Name
% Teacher's Name
School Name
Street Address
City, State Zip

If you have any other related material available, please enclose them also. I will appreciate any help you can give me on this project.

Sincerely,

(*Your Name*)

LETTER FORMAT OF A REQUEST FOR TRAINING INFORMATION

INSTRUCTIONS: Write a letter (similar to the one in Activity 3) to a junior college or university requesting a copy of their current catalog and schedules of credit/non-credit courses. Review CIS/MIS offerings. Place the information in your notebook, prepare a one page listing of the offerings, and give an oral report to your classmates.

REPORT FORMAT FOR PERIODICAL/NEWSPAPER REVIEWS

INSTRUCTIONS: **Choose two computer-related periodicals/newspapers and write a one-page description of each. Indicate the predominant kind of information a MIS professional will find in that publication.**

Suggested format:

Title of the Publication, publisher, date, volume.

Overview of the publication: Generalized statement of the target audience of this publication.

Introductory paragraph that lists the specialized topics and sections pertaining to the MIS professional or that he/she would find of interest.

Three paragraphs giving overviews of three articles or sections that would be interesting to a MIS professional.

DIFFICULTIES IN USING MANUALS

INSTRUCTIONS: **List five difficulties encountered when using manuals.**

1.

2.

3.

4.

5.

USER GROUP INFORMATION FORM

INSTRUCTIONS: **Visit a computer user group in your area and complete the following form. Make an oral report to your class describing your experience. Add this sheet to your notebook.**

Name of the user group: ____________________

Equipment orientation: ____________________

Listing of SIGS: ____________________
____
____
____

Topic of the General Session: ____________________

Membership: __________ No. of current members: __________ Average attendance: __________

SIG you attended: ____________________

Summarize what was presented and discussed in the SIG (at least three paragraphs):

Provide membership costs and the benefits of membership:

Conclusion statement: Describe your overall feelings about the meeting. What was the makeup of the audience (ratio of men, women, children, youth)? What did you get out of the meeting? Would you recommend the experience to others?

Enclose a sample of their monthly publication.

REFERENCE MANUAL AS A RESOURCE

INSTRUCTIONS: Using a product's reference manual as a resource, write a summary paragraph describing the overall purposes of a new product or system.

DETERMINING YOUR LEADERSHIP STYLE

INSTRUCTIONS: **To find out what kind of leader you will be, place in the space the letter that best describes the way you would act if you were the leader of a work group. A--Always, F--Frequently, O--Occasionally, S--Seldom, or N--Never.**

I would:

______ 1. act as the speaker of the group

______ 2. encourage overtime work

______ 3. allow group members complete freedom in their work

______ 4. encourage all group members to do tasks the same way

______ 5. permit others to use their own judgment in solving problems

______ 6. work the group members as hard as it takes to stay ahead of competing groups

______ 7. speak as a representative of the group

______ 8. push members for greater effort

______ 9. let the members do their work the way they think best

______ 10. not mind making decisions

______ 11. speak for the group when visitors are present

______ 12. keep the work moving at a rapid pace

______ 13. turn the members loose on a job and let them go to it

______ 14. push others to increase the work they are doing

______ 15. settle conflicts when they occur in the group

______ 16. represent the group at outside meetings

______ 17. not allow the members freedom of action

______ 18. decide what should be done and how it should be done

______ 19. not mind others thinking I am too tough on them

______ 20. assign group members to particular tasks

______ 21. let some deserving members have authority

______ 22. let the members decide when and how to do their work

______ 23. be willing to make changes

______ 24. ask the members to work harder

______ 25. trust the group members to exercise good judgment

______ 26. schedule the work to be done, but distribute it fairly

______ 27. refuse to explain my actions

______ 28. persuade others that my ideas are to their advantage

______ 29. permit the group to set its own pace

______ 30. let group members know work will be done my way or no way at all

______ 31. act without consulting the group

______ 32. tell the group members that if one rule or regulation is broken by any employee, it will result in his/her being fired

Scoring:

Write the number 1 in front of the space if you responded A--Always or F--Frequently. Circle the number 1's which you have written in front of the following items:

3, 5, 9, 10, 13, 15, 21, 22, 23, 25, 26, 29

Count the circled number 1's. This is your score for concern for people. Count the uncircled number 1's. This is your score for concern for task.

People ____________________ Task __________________

A high score on "Concern for People" suggests that your leadership style ranges from a loose-rein style to a democratic style. A high score on "Concern for Task" suggests you tend to have an autocratic leadership style.

METHODS OF TRACKING TIME

INSTRUCTIONS: List and explain the various methods for tracking time spent on a project. Describe how managers charge project costs to the proper account.

NOTEBOOK

INSTRUCTIONS: **Collect the following in a three-ring notebook. Make sure that your notebook is neat and that it is completed on time. It is something that will be evaluated each grading period. Get a list from your teacher of the exact contents and format to be used. Some suggested materials might include:**

Articles and their abstracts

Letters of invitation to speakers:
    A speaker notetaking form for each speaker that made presentations
    Evaluation form
    Copy of thank you note that you wrote

Copy of letter requesting information:
    Listing of the information received
    Evaluation as to its usefulness
    Written report on the material

Different kinds of status reports for your week's activities.

Weekly time reports reflecting the week's work in school activities.

Information on human relations at work and leadership style.

Other information as suggested by your teacher.

COMPETENCY TEST

PART I: CURRENT COMPUTER PUBLICATIONS

INSTRUCTIONS: **Name and describe the general content of three computer-related periodicals\newspapers.**

1. Name of Periodical:

   Content Description:

2. Name of Periodical:

   Content Description:

3. Name of Periodical:

   Content Description:

PART II: IDENTIFICATION OF TECHNICAL TRAINING AND SUPPORT GROUPS

INSTRUCTIONS: **Identify five sources of technical training available to the MIS professional.**

1.

2.

3.

4.

5.

Describe the type of information that a user group can provide.

PART III: USING A TECHNICAL MANUAL

INSTRUCTIONS: Describe the basic parts of technical manuals. Take one manual provided by your teacher, and evaluate it for ease of use and check to make sure it has all the basic parts needed for use by the average person.

PART IV: TRACKING TIME SPENT ON A PROJECT AND COST PROCEDURES

INSTRUCTIONS: **List two reasons why programmers report time spent on projects.**

1.

2.

Compare and contrast the two types of project deadlines.

milestone

final

Give two reasons why managers need to use statistics.

1.

2.

Describe procedures for charging project costs.

PART V: GROUP INTERACTION AND LEADERSHIP STYLES

INSTRUCTIONS: Make a list of five personal traits that are important for getting along with co-workers and tell why they are important.

1.

2.

3.

4.

5.

INSTRUCTIONS: Distinguish between the role of a group leader and the role of a team leader in achieving group objectives.

COMPETENCY CHECKLIST

ESSENTIAL ELEMENT: 75.87(h)(1)(A)

The student will be provided opportunities to: demonstrate a comprehension of the system development process.

OBJECTIVE: Students will summarize and give examples of the tasks programmers perform which enhance their professionalism.	MASTERY	NON MASTERY
1. Review five current computer periodicals/ newspapers that consistently contain articles in the system development area.	____	____
2. Identify sources of technical training and information exchanges available to the computer professional.	____	____
3. Describe the parts of technical manuals that assist the user in becoming more familiar with a product or a system.	____	____
4. Describe various methods of tracking time spent on a project and the percentage of task remianing in order to keep a project on deadline and assist managers in charging project costs to the proper account.	____	____
5. Discuss the types of group communications and individual leadership styles.	____	____
	____	____
	____	____
	____	____

STUDENT NAME ______________________________

COMPLIANCE STATEMENT

TITLE VI, CIVIL RIGHTS ACT OF 1964; THE MODIFIED COURT ORDER, CIVIL ACTION 5281, FEDERAL DISTRICT COURT, EASTERN DISTRICT OF TEXAS, TYLER DIVISION

Reviews of local education agencies pertaining to compliance with Title VI Civil Rights Act of 1964 and with specific requirements of the Modified Court Order, Civil Action No. 5281, Federal District Court, Eastern District of Texas, Tyler Division are conducted periodically by staff representatives of the Texas Education Agency. These reviews cover at least the following policies and practices:

(1) acceptance policies on student transfers from other school districts;

(2) operation of school bus routes or runs on a non-segregated basis;

(3) nondiscrimination in extracurricular activities and the use of school facilities;

(4) nondiscriminatory practices in the hiring, assigning, promoting, paying, demoting, reassigning, or dismissing of faculty and staff members who work with children;

(5) enrollment and assignment of students without discrimination on the basis of race, color, or national origin;

(6) nondiscriminatory practices relating to the use of a student's first language; and

(7) evidence of published procedures for hearing complaints and grievances.

In addition to conducting reviews, the Texas Education Agency staff representatives check complaints of discrimination made by a citizen or citizens residing in a school district where it is alleged discriminatory practices have occurred or are occurring.

Where a violation of Title VI of the Civil Rights Act is found, the findings are reported to the Office for Civil Rights, Department of Health, Education and Welfare.

If there is a direct violation of the Court Order in Civil Action No. 5281 that cannot be cleared through negotiation, the sanctions required by the Court Order are applied.

TITLE VII, CIVIL RIGHTS ACT OF 1964; EXECUTIVE ORDERS 11246 AND 11375; TITLE IX, 1973 EDUCATION AMENDMENTS; REHABILITATION ACT OF 1973 AS AMENDED; 1974 AMENDMENTS TO THE WAGE-HOUR LAW EXPANDING THE AGE DISCRIMINATION IN EMPLOYMENT ACT OF 1967; AND VIETNAM ERA VETERANS READJUSTMENT ASSISTANCE ACT OF 1972 AS AMENDED IN 1974.

It is the policy of the Texas Education Agency to comply fully with the nondiscrimination provisions of all federal and state laws and regulations by assuring that no person shall be excluded from consideration for recruitment, selection, appointment, training, promotion, retention, or any other personnel action, or be denied any benefits or participation in any programs or activities which it operates on the grounds of race, religion, color, national origin, sex, handicap, age, or veteran status (except where age, sex, or handicap constitute a bona fide occupational qualification necessary to proper and efficient administration). The Texas Education Agency makes positive efforts to employ and advance in employment all protected groups.